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THE PRINCIPLES OF TEACHING

BASED ON PSYCHOLOGY

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BASED ON PSYCHOLOGY

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BY

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By Edward L. Thorndike

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PREFACE

The aim of this book is to make the study of teaching scientific and practical—scientific in the sense of dealing with verifiable facts rather than attractive opinions, practical in the sense of giving knowledge and power that will make a difference in the actual work of teaching. It follows the example of the better books on education in basing principles of teaching upon the laws of psychology; it makes use of modern scientific psychology and especially of recent investigations in genetic and dynamic psychology; it seeks to make use also of the direct studies of teaching itself which have been made by qualified experts; it is arranged as a manual to guide the student in applying principles himself rather than as a series of discussions to be thought out or, more often, to be simply absorbed.

The book demands of students knowledge of the elements of psychology, particularly of dynamic psychology. The references entitled 'Preparatory' (or their equivalent) will fulfill this prerequisite. These references are to the author's *Elements of Psychology,* which is in a sense an introduction to the present volume, but any standard course in psychology which gives due emphasis to the laws of mental connections will supply the preparation needed.

Scientific principles are the back-bone of knowledge of teaching but concrete exercises are its flesh and blood. For the work of the student of teaching is to get practical control of principles by using them. The author offers no excuse for using over a third of his pages for such exercises; indeed, they should occupy more than two-thirds of the student's time. They aim in some cases to test and increase the student's knowledge of principles; in others to insure the habit and power of application of general principles to the particular problems of the schoolroom; in others to give training in judging the theories, methods and devices which each year's output of educational literature brings to a teacher's attention. In all cases they aim to make thought about teaching more logical and scientific.

The references for further reading are of two sorts. The first, given at the end of each chapter, are to readings designed to extend the knowledge given in the text or to suggest useful comparisons. These readings are all included in ten books so chosen as to give students an adequate view of the present status of knowledge and expert opinion about teaching, and to form the nucleus of a teacher's professional library. They are:—

J. Adams, *The Herbartian Psychology Applied to Education*, 1898.[1]
A. Bain, *Education as a Science*, 1887.
J. Dewey, *School and Society*, 1900.
C. W. Eliot, *Educational Reform*, 1898.
E. W. Hope and E. A. Browne, *A Manual of School Hygiene*, 1901.
W. James, *Talks to Teachers on Psychology*, 1899.
E. A. Kirkpatrick, *The Fundamentals of Child Study*, 1903.
J. MacCunn, *The Making of Character*, 1900.
C. A. McMurry and F. M. McMurry, *The Method of the Recitation* (revised edition), 1903.

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[1] The dates give the edition to which the reference applies. Any edition will serve, however, except in the case of the McMurrys' Method of the Recitation, where the edition should be 1903 or later.

H. Spencer, *Education: Intellectual, Moral, and Physical* (the references fit any edition).

The second sort of references, given at the end of the book, are designed to aid students in such studies of special topics as they may profitably undertake.

In the text there are ninety-seven quotations, mostly of passages requiring critical comment in the *Exercises.* Since the student should in such cases make his judgments uninfluenced by the source of the passage, the sources are not given in the text. For the sake of anyone who may need to know the source of any such quotation a number in brackets follows each and, in the SOURCES OF QUOTATIONS at the end of the book, the reference is given for each number. When it is proper that the source of a quotation should be known at the time that it is read, the reference is given in the text itself also.

Teachers College, Columbia University,
December, 1905.

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The Principles of Teaching

CHAPTER I

INTRODUCTION

§ 1. *The Teacher's Problem*

The Aims, Materials and Methods of Education.—The word Education is used with many meanings, but in all its usages it refers to *changes*. No one is educated who stays just as he was. We do not educate anybody if we do nothing that makes any difference or change in anybody. The need of education arises from the fact that *what is* is not what *ought to be*. Because we wish ourselves and others to become different from what we and they now are, we try to educate ourselves and them. In studying education, then, one studies always the existence, nature, causation or value of changes of some sort.

The teacher confronts two questions: 'What changes to make?' and 'How to make them?' The first question is commonly answered for the teacher by the higher school authorities for whom he or she works. The opinions of the educational leaders in the community decide what the schools shall try to do for their pupils. The program of studies is planned and the work which is to be done grade by grade is carefuly outlined. The grammar-school teacher may think that changes in knowledge represented by the ability to read a modern language ought to be made in boys and girls before the high-school, but the decision is rarely his; the primary teacher may be obliged to teach arithmetic although her own judgment would postpone giving the knowledge of numbers until the fifth or sixth grade.

What changes should be made in human nature by primary, grammar and high schools and why these and not other changes should be the aim of the schools, are questions usually answered under the heading 'Principles of Education.' How most efficiently to make such changes as educational aims recommend, is a question usually answered under the headings 'Principles of Teaching,' or 'Methods of Teaching,' or 'Theory and Practice of Teaching,' or 'Educational Psychology.' This book will try to answer this latter question,—to give a scientific basis for the art of actual teaching rather than for the selection of aims for the schools as a whole or of the subjects to be taught or of the general result to be gained from any subject. Not the *What* or the *Why* but the *How* is its topic.

It is not wise however to study the *How* of teaching without any reference to the *What* or the *Why*. If a teacher does not appreciate, at least crudely, the general aims of education, he will not fully appreciate the general aims of school education; if he does not appreciate the general aims of school education, he will not fully appreciate the aims of his special grade or of any one special subject; if he does not have fairly clear ideas of what the year's work as a whole or of what each subject as a whole ought to accomplish for the scholars, he will not know exactly what he is about in any particular day's work. The teacher must be something more than the carpenter who follows without reflection the architect's plan, or the nurse who merely administers the physician's prescriptions. His relation to the administration of the school system and the program of studies is more like that of the builder who is told to make the best house he can at a cost of ten thousand dollars, using three laborers, a derrick and such and such tools and providing especially for light, ventilation and protection against fire. Superior authorities say, 'Make the best boys and girls you can, using arithmetic, geography, school regulations and so on, providing especially for knowledge, good habits of thought, worthy interests, bodily health, noble feelings and honest, unselfish conduct.' The builder must often study how to dig a foundation, how to erect a frame, how to lay a floor and the like with reference to what is to be built; the teacher should often study how to utilize inborn tendencies, how to form habits, how to develop interests and the like with reference to what changes in intellect and character are to be made. The teacher should know about educational aims and values as well as about such principles of teaching as directly concern his own activities in the class-room.

The next three pages will accordingly outline the essential facts concerning the ideals which, in the opinion of the best qualified thinkers, should be followed in American education, and throughout the book due attention will be given to such facts about the ends the teacher should seek as he needs to know to improve his teaching.

The Aims of Education.—Education as a whole should make human beings wish each other well, should increase the sum of human energy and happiness and decrease the sum of discomfort of the human beings that are or will be, and should foster the higher, impersonal pleasures. These aims of education in general—good-will to men, useful and happy lives, and noble enjoyment—are the ultimate aims of school education in particular. Its proximate aims are to give boys and girls health in body and mind, information about the world of nature and men, worthy interests in knowledge and action, a multitude of habits of thought, feeling and behavior and ideals of efficiency, honor, duty, love and service. The special proximate aims of the first six years of school life are commonly taken to be to give physical training and protection against disease; knowledge of the simple facts of nature and human life; the ability to gain knowledge and pleasure through reading and to express ideas and feelings through spoken and written language, music and other arts; interests in the concrete life of the world; habits of intelligent curiosity, purposive thinking, modesty, obedience, honesty, helpfulness, affection, courage and justice; and the ideals proper to childhood.

The special proximate aims of school life from twelve to eighteen are commonly taken to be physical health and skill; knowledge of the simpler general laws of nature and human life and of the opinions of the wisest and best; more effective use of the expressive arts; interests in the arts and sciences, and in human life both as directly experienced and as portrayed in literature; powers of self-control, accuracy, steadiness and logical thought, technical and executive abilities, cooperation and leadership; habits of self-restraint, honor, courage, justice, sympathy and reverence; and the ideals proper to youth.

With respect to the amount of emphasis upon different features of these general ideals, the best judgment of the present rates practical ability somewhat higher and culture of the semi-selfish sort somewhat lower than has been the case in the past. No sensible thinker about education now regards the ability to support oneself as a mean thing. Every one must gain power at school as well as at home to pull his own weight in the boat, to repay in useful labor what the world gives him in food and shelter. The cultured idler is as one-sided as the ignorant and clownish worker and may be even more of a danger to the world. The schools must prepare for efficiency in the serious business of life as well as for the refined enjoyment of its leisure.

The best judgment of the present gives much more weight than has been the case previously to health, to bodily skill and to the technical and industrial arts. The ideal of the scholar has given way to the ideal of the capable man—capable in scholarship still, but also capable in physique and in the power to manipulate things.

Very recently thinkers about education have dwelt more and more upon the importance of aiming not only to prepare children for adult life and work but also to adapt them to the life of childhood itself. Aim more to make children succeed with the problems and duties of childhood and less to fit them for the problems and duties of twenty years after; let education adapt the child to his own environment as well as to some supposed work of his later years—such are the recommendations of present-day theories of education.

In actual practice aims often conflict. A gain in knowledge may mean a loss in health; to arouse ideals may mean less time for drill in correct habits; in zeal for the development of love of the beautiful the interest in the dry, cold facts of science may have to be neglected. The energy of any teacher, and of scholars as well, is limited. All that can be expected is that none of the aims of school education shall be wilfully violated and that energy should be distributed among them all in some reasonable way.

The degrees of emphasis on the different proximate aims vary (1) with the nature of the individual to be educated and (2) with the nature of the educational forces besides the school which are at work. Thus (1) the emphasis in a school for the feeble-minded is not the same as in an ordinary school; the emphasis in a high school representing a selection of the more ambitious, intellectual and energetic is not the same as in a school where the selection is simply on the basis of the ability of the parents to pay tuition. (2) The emphasis in a primary school attended by the children of recent immigrants will differ from that in a school in a suburb inhabited by American professional and business families. A high school in a farming community in the Southwest should not pattern its ideals after those proper to a school in New York City.

The Special Problem of the Teacher.—It is the problem of the higher authorities of the schools to decide what the schools shall try to achieve and to arrange plans for school work which will attain the desired ends. Having decided what changes are to be made they entrust to the teachers the work of making them. The special problem of the teacher is to make these changes as economically and as surely as is possible under the conditions of school life. His is the task of giving certain information, forming certain habits, increasing certain powers, arousing certain interests and inspiring certain ideals.

The study of the best methods of doing so may be carried to almost any degree of detail. The principles of teaching may mean the general principles applicable to the formation of all habits or the highly specialized rules of procedure for forming the habit of correct use of *shall* and *will;* they include the laws valid for the acquisition of any knowledge and the discussion of the particular difficulties in teaching the spelling of *to, two* and *too.* But the problem is always fundamentally the same:—Given these children to be changed and this change to be made, how shall I proceed? Given this material for education and this aim of education, what means and methods shall I use?

§ 2. *Psychology and the Art of Teaching*

The Scientific Basis of Teaching.—The work of teaching is to produce and to prevent changes in human beings; to preserve and increase the desirable qualities of body, intellect and character and to get rid of the undesirable. To thus control human nature, the teacher needs to know it. To change what is into what ought to be, we need to know the laws by which the changes occur. Just as to make a plant grow well the gardener must act in accordance with the laws of botany which concern the growth of plants, or as to make a bridge well the architect must act in accordance with the facts of mechanics concerning stresses and strains, or as to change disease into health the physician must act in accordance with the laws of physiology and pathology, so to make human beings intelligent and useful and noble the teacher must act in accordance with the laws of the sciences of human nature.

The sciences of biology, especially human physiology and hygiene, give the laws of changes in bodily nature. The science of psychology gives the laws of changes in intellect and character. The teacher studies and learns to apply psychology to teaching for the same reason that the progressive farmer studies and learns to apply botany; the architect, mechanics; or the physician, physiology and pathology.

Stimulus and Response.—Using psychological terms, the art of teaching may be defined as the art of giving and withholding stimuli with the result of producing or preventing certain responses. In this definition the term stimulus is used widely for any event which influences a person,—for a word spoken to him, a look, a sentence which he reads, the air he breathes, etc., etc. The term response is used for any reaction made by him, —a new thought, a feeling of interest, a bodily act, any mental or bodily condition resulting from the stimulus. The aim of the teacher is to produce desirable and prevent undesirable changes in human beings by producing and preventing certain responses. The means at the disposal of the teacher are the stimuli which can be brought to bear upon the pupil,—the teacher's words, gestures and appearance, the condition and appliances of the school room, the books to be used and objects to be seen, and so on through a long list of the things and events which the teacher can control. The responses of the pupil are all the infinite variety of thoughts and feelings and bodily movements occurring in all their possible connections.

The stimuli given by the teacher to arouse and guide the pupil's responses may be classified as:—

A. Stimuli under direct control.

The teacher's movements,[1]—speech, gestures, facial expression, etc.

B. Stimuli under indirect control.

The physical conditions of the school,—air, light, heat, etc.

The material equipment of the school,—books, apparatus, specimens, etc.

The social conditions of the school,—the acts (including spoken words) of the pupils and the spirit which these acts represent.

The general environment,—acts of parents, laws, libraries, etc.

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[1] The knowledge, love and tact of the teacher are, of course, of the highest importance as forces in teaching but their actual operation is in their expression in words, gestures or acts of some sort.

The responses may be classified as:—

A. Physiological responses, such as deeper breathing, sounder sleep, vigorous exercise and the like.

B. Responses of knowledge,[1] such as connecting a sense stimulus with an appropriate percept, abstracting one element from a complex fact or making associations of ideas.

C. Responses of attitude, such as the connection of attention, interest, preference and belief with certain situations.

D. Responses of feeling, such as connecting sympathy, love, hate, etc., with certain situations.

E. Responses of action or of conduct and skill, connecting certain acts or movements with certain mental states.

The Value of Psychology.—If there existed a perfect and complete knowledge of human nature,—a complete science of psychology,—it would tell the effect of every possible stimulus and the cause of every possible response in every possible human being. A teacher could then know just what the result of any act of his would be, could prophesy just what the effect of such and such a page read or punishment given or dress worn would be,—just how to get any particular response, of attention to this object, memory of this fact or comprehension of that principle.

Of course present knowledge of psychology is nearer to zero than to complete perfection, and its applications to teaching must therefore be often incomplete, indefinite and insecure. The application of psychology to teaching is more like that of botany and chemistry to farming than like that of physiology and pathology to medicine.

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[1] Knowledge is used here in a broad sense to include sensing objects, analyzing facts, feeling relationships and drawing inferences, as well as memory of facts or associations of ideas.

Anyone of good sense can farm fairly well without science, and anyone of good sense can teach fairly well without knowing and applying psychology. Still, as the farmer with the knowledge of the applications of botany and chemistry to farming is, other things being equal, more successful than the farmer without it, so the teacher will, other things being equal, be the more successful who can apply psychology, the science of human nature, to the problems of the school.

§ 3. *Exercises*

1. In teaching which of the following subjects would you depend most upon responses of knowledge? Upon responses of feeling? Upon responses of action?—Literature, Manual Training, Latin.

2. Rank the following subjects in order according to the importance in them of responses of analysis: Music, History, Grammar.

3. Rank them according to the importance of responses of feeling.

4. Name two school studies which specially seek responses of observation.

5. Name two which specially seek responses of bodily skill.

6. Name two which specially seek responses of inference.

7. What sort of response is implied in each of the following?

a. Learning the meanings of the numbers from one to seven.

b. Learning to dance.

c. " to love one's enemies.

d. " the definition of a verb.

e. Learning the sounds of the letters.
f. " to obey a teacher.
g. " the principal parts of a verb.
h. " to study in a noisy room.
i. " to be good-natured, though provoked.

8. To teach some of the school subjects, one must call forth responses of all four kinds, of knowledge, attitude, feeling and action. Show that this statement is true of geography.

9. Name some stimuli besides words and books which are essential in teaching geography.

10. In teaching morality.

11. In promoting the enjoyment of school life.

12. In training for good citizenship.

For Further Reading

C. W. Eliot, *Educational Reform*, Chapters III, V-XIV inclusive, and XVIII.

H. Spencer, *Education*, Chapter I.

J. Adams, *Herbartian Psychology Applied to Education*, Chapters I and II.

CHAPTER II

Physical Education

§ 4. *The Care of the Body*

As an End in Itself.—Bodily health and vigor are important in education both as ends and as means. They are ends because happiness and usefulness depend upon a sound body as well as upon a sound mind and morals. The school must accept a share with the home and with private and public agencies of the burden of maintaining the natural vigor of children, preventing diseases and remedying defects. It is its duty to keep children's eyes in good condition as well as to teach them to read. To prevent scarlet fever or to eradicate consumption is the duty of the school as well as of the hospital. The teacher must teach for health as well as for knowledge or conduct, and the well-equipped teacher will know and apply physiology and hygiene.

The special principles of physical education lie outside the scope of this book. But some very general rules of guidance may be stated.

Health is better than strength or grace. The action of the heart and other parts of the circulatory system, of the lungs, of the digestive organs and of the excretory organs is far more important than the action of the voluntary muscles of arms, legs and chest. The indirect results of exercise upon the system in general outweigh tenfold the direct effect on the size and strength of the muscles.

Pure air, nourishing food and sound sleep are the essentials for healthy growth. Exercise is probably essential also, but no system of gymnastics can make up for a lack in the other three. As a rule free movements, such as swimming, are superior to forced movements involving sudden inhibitions and opposing contractions such as the common dumb-bell drills. Exercise outdoors is better than exercise in any ordinary gymnasium and far better than exercise in a school class-room. Exercise taken in play with enjoyment is better than exercise taken as a task.

As a Means to Intellectual and Moral Welfare.—Under present conditions the class-room teacher, though concerned with bodily health as an aim of the school, is perhaps more concerned with bodily conditions as means to the production of desirable changes in intellect and character. For the mind is the servant of the body as well as its master, and the mind's responses are often best influenced through bodily conditions. For example, the quality of the work of a primary-school class may be raised several degrees by the proper seating of children who are partially deaf and by the provision of proper glasses for children with defects of vision. The general efficiency of the vital organs is the desirable if not the necessary basis for good spirits, good conduct and good thinking. For the sake of proper intellectual and moral progress, then, as well as for the sake of the health and happiness of the scholars, teachers should cooperate with families and public agencies in remedying and preventing defects and in improving general bodily conditions.

The relation between bodily conditions and mental welfare is not everywhere equally close. The loss of one's toes makes little difference, whereas the loss of one's eyes is an enormous handicap. Pneumonia rarely, but scarlet fever often, leaves mental weakness in its train. Strength of an arm means little to either intellect or disposition, but skill of hand and eye is a great aid in school work. A good digestion is the mother of cheerfulness and peace. As a rule what influences the central nervous system, the organs of sense and the nervous and muscular apparatus for moving the eyes, mouth-parts and hands, will have a direct effect upon intellectual activities.

§ 5. *Remedying Defects*

Defects of Sight and Hearing.—Unless the stimuli given by the teacher are properly felt, proper responses cannot be made. No matter how cleverly the teacher talks, it will be vain unless the pupil hears. Knowledge that a child has only one-tenth of normal acuity of vision may be of greater help in teaching him than many elaborate books and pictures.

There will rarely be a class of thirty scholars without two or more children who have defects of vision or hearing so great as to seriously impair their power of receiving stimuli. If the pupils so affected were themselves conscious of their defects, not so much harm would be done; but in point of fact college students are found who are totally deaf in one ear or blind in one eye or markedly color blind without being in the least aware of it, and in the first years of school life a large proportion of the children defective in hearing or vision are entirely unaware of their difficulty. The deaf ones have for so long had to strain every nerve and watch people's gestures and half guess at the meaning of the dimly and partially heard words that they have no reason to think of their condition as anything peculiar. Those defective in vision have for so long been obliged to labor to decipher and interpret the misty, fleeting objects of vision,—reading has so commonly meant a headache to them,—that they take their troubles as a matter of course. Young children cannot be expected to themselves discover and report their defects; their parents will often do as little. The school must not only give proper stimuli but also note the condition of the organs for receiving stimuli, remedying the defects which exist when possible, and so arranging the class instruction that irremediable defects will do the least possible harm.

Other Defects.—Gross defects of the motor apparatus such as paralyses and contractures, are fairly obvious; common sense as well as psychology will recommend that allowance be made for pupils suffering from them in the work of writing, drawing and the like.

Obstruction of the throat and nasal passages by enlarged tonsils and adenoid growths is a not uncommon cause of deafness and dullness. Teachers should observe carefully any children who habitually breathe through the mouth and should cooperate with parents to secure medical advice for them. In many cases the safe and easy operation of removing such growths brings a marked improvement in the comfort and school progress of the pupil.

Within the last decade the schools have more and more extended the work of cooperating with the family and public authorities with respect to the care of other bodily defects. Some school systems provide for an examination of the children's teeth and for securing necessary dental work; some send trained nurses to the houses to instruct parents in the treatment of minor diseases. It has been proposed to establish special schools for cripples.

Teachers may feel sure that their cooperation with any wise plan for the amelioration of physical defects will result not only in improving the physical health of the community but also in making more efficient the intellectual and moral training of the school. It may not seem to be, and may not be, the teacher's business to cure a toothache, but there may be no more effective way to insure a pupil's progress than to get rid of the physical pain, the digestive disorders, the eye troubles and the susceptibility to diseases of the throat which may result from decayed teeth.

§ 6. *The Prevention of Defects*

All the arguments for the cure of defects apply with even greater force to their prevention. Schools should be positive forces for health and teachers should study and practice the requirements of school hygiene, not only because health should be an aim of the school but also because health is a means to mental and moral welfare.

Unfortunately there is in some respects a conflict between the demands of health and the demands of intellectual and moral training. There would probably be fewer eye troubles if we never read books or worked at occupations demanding skill; children would probably be less sickly if till the age of sixteen they spent the twenty-five hours a week of school time in running, swimming, play with animals, and work out of doors in garden, field and woods. To some extent we barter our health for the other valuables,—knowledge, skill, and habits of utility to the community. At present we probably thus sell too much of health, but it would be equally unwise to sacrifice everything for health. It is better to be a Socrates with a headache than a perfectly healthy pig. There must be a compromise.

At all events, it is idiotic to neglect health when its neglect means mental and moral loss also; it is wicked to sacrifice it for nothing; and it is unwise not to rank its claims as approximately equal to those of the intellect.

General Bodily Conditions.—The teacher can only to a slight extent control the air, light, food, sleep and exercise of a class. The large size of classes, the character of school buildings and grounds, the five-sixths of the pupil's time that are spent away from the school and many other factors limit the teacher's influence. But when half of the six-year-olds in a primary class come to school after a breakfast of two or three bakehouse cakes and a cup of coffee or with none, it is a question whether the teacher had not better give up a week to teaching the parents rather than the children. In some city kindergartens it would be better for half the children to be put to bed than set to play.

SUMMARY

Good teaching treats health as of importance comparable with intellectual progress. Good teaching takes account of the bodily conditions of pupils and cooperates with parents and public authorities for their improvement.

The teacher should first, know these bodily conditions in the case of each pupil; second, do what is appropriate to remedy them; and third, allow for them in arrangements for teaching and in estimates of pupils.

§ 7. *Exercises*

1. What is your opinion of each of the following facts?

(a) In a city school seventy per cent. of the pupils spent over five hours a day (except on Saturdays and

Sundays) in home work in preparation of school lessons, and less than an hour and a half a day outdoors.

(b) A nine-year-old boy was inattentive and very restless in school; his teacher rebuked him and he complained of having a headache; his teacher paid no attention to his complaint and on further misbehavior on his part sent him to the principal for punishment; the principal took his temperature, found it to be over 102 and sent him home, with a note for his parents.

2. What would you have written in a note to the parents?

3. Make out a set of rules such as you think a teacher ought to follow with respect to the health regulations of the city in which he or she lives, to acquaintance with free clinics and the means of admission to them, to medical inspectors of schools, to knowledge of the ventilating system of the school building and to the examination of vision and hearing.

4. What do boys and girls commonly buy for luncheon when because of the length of the session or for other reasons they do eat a luncheon at school?

5. Make out (a) a list of five or more articles of food which you would require to be on sale in a school lunch room; (b) a list of five or more articles of food which you would not allow to be sold.

6. Illustrate the fact that a little knowledge may be a dangerous thing by causing a teacher to attempt the work properly belonging to a physician.

7. Illustrate the fact that true care for the health of children does not mean constant inquiry about their symptoms or advice to them about their habits.

8. What measures besides reseating can you devise to assist a deaf pupil?

9. What measures can you devise to assist a near-sighted pupil besides fitting him with proper glasses?

10. Very little children when reading often hold their books only partly open, say at an angle of 100 instead of 180 degrees. Should primers and other beginning books be stiffly bound? Should they have the wider margin on the inner or the outer edge of the page?

11. Name three studies in which color blindness would injure a pupil's work.

12. Why would it be important to know of physical defects even though nothing could be done to cure them or to make the pupil work more easily in spite of them?

13. Name two or more features of high-school work which involve an extra tax on the eyes with little compensating value (*e. g.*, the use of German print).

Experiment 1. Record the time taken by six or eight children, to read passage A. To read passage B. Record their answers to the question, 'Which is the easier to read?' What conclusions do you draw concerning blackboard writing and the printing of school-books?

A

I mused for some time upon what he had said, and found it was a very rational conclusion, and that therefore something was to be resolved on very speedily, as well to draw the men on board into some snare for their surprise, as to prevent their landing upon us, and destroying us; upon this it presently occurred to me, that in a little while, the ship's crew, wondering what was become of their comrades, and of the boat, would certainly come on shore in their other boat to seek for them; and that then perhaps they might come armed, and be too strong for us: this he allowed was rational. Upon this I told him, the first thing we were to do, was to stave the boat, which lay upon the beach, so that they might not carry her off: and taking everything out of her, leave her so far useless as not

B

It was happy for the poor man that it was my man Friday; for he, having been used to that kind of creature in his country, had no fear upon him, but went close up to him, and shot him as above; whereas any of us would have fired at a further distance, and have perhaps either missed the wolf, or endangered shooting the man. But it was enough to have terrified a bolder man than I, and indeed it alarmed all our company, when, with the noise of Friday's pistol, we heard on both sides the dismallest howlings of wolves, and the noise redoubled by the echo of the mountains, that it was to us as if there had been a prodigious multitude of them; and perhaps indeed there was not such a few, as that we had no cause of apprehensions. However, as Friday had killed this wolf, the other, that had fastened upon the horse, left him immediately, and fled having happily fastened upon his head,

For Further Reading

E. W. Hope and E. A. Browne, *A Manual of School Hygiene*, Chapters III-XIV inclusive.

E. A. Kirkpatrick, *Fundamentals of Child Study*, Chapter XVII.

CHAPTER III

INSTINCTS AND CAPACITIES

Preparatory, *Elements of Psychology*, §§ 30-34[1]

§ 8. *Natural Tendencies in General*

What human beings become depends upon the tendencies which are born in them as well as the training which is given to them. Nature as well as nurture forms human intellect and character. To be effective, nurture or education must allow for the forces of nature. To teach boys and girls without paying heed to the equipment of instincts and capacities which they already possess apart from teaching would be as foolish as to sail a boat regardless of the direction of the wind or to build a house regardless of the material at hand.

Education should at times stimulate and favor inborn tendencies, at times inhibit them, and, most frequently of all, direct and guide them. The capacity for active thought and reasoning, for instance, needs encouragement; the teasing and bullying instinct must be inhibited; the inborn tendencies to curiosity and sympathy must be directed into useful channels and transformed into habits of intelligent thinking or sensible and noble action. Mere greed of knowledge is of value only in its possibilities; to pity everything and everybody may be as truly a vice as to pity no one.

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[1] The author's *Elements of Psychology* is the book referred to here and in later preparatory references.

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Utilizing Natural Tendencies.—Education may also be made more and more economical in proportion as it utilizes the forces of natural tendencies to attain its ideal ends. Whenever we work with rather than against nature the task becomes easy and the burden light. Fractions become easy with the help of apples and blocks and knives and jig-saw because the instinctive tendencies to attend to concrete objects and to enjoy physical action and manipulation are called into service.

Teaching may be wasteful or even harmful by neglect of the fact of delayed instincts and capacities. Theology for the ten-year-old in Sunday schools and Jane Austen's novels for high-school boys are much the same as cabbage for babies. Cabbage is a good food only when the capacity to digest it exists. Teaching little girls to be attentive to their dress and appearance is much the same as trying to teach an infant of six months to walk. The interests in clothes and looks will come of itself with adolescence just as the walking instinct will come of itself at the beginning of the second year.

Just as the delayed appearance of inborn tendencies makes too early teaching wasteful, so their transitoriness makes too tardy teaching fruitless. The manual dexterity of the pianist, for instance, must be acquired early in life if at all. The instincts and capacities important in education are, however, for the most part long-lived, and, if not suppressed by actual ill-treatment, persist through the years of school life without special stimulation from teachers. So with the instincts of action, curiosity, the love of outdoor life and sport, emulation and many others.

Destroying Natural Tendencies.—Harmful instincts and capacities are weakened or inhibited by *disuse* (by depriving them of exercise, by not allowing the situations which would evoke them to appear), *substitution* (by forming the habit of meeting the situation in some other way) and by *punishment*. Thus the tendency of a child to chase and torment a kitten may be inhibited by giving the child no kitten to play with, or by teaching him early to stroke and feed the kitten, or by beating him in case he does pull its tail and throw stones at it.

Disuse is convenient and is an excellent method to employ when the harmful tendency is transitory, but it is never quite sure. *Punishment* is ineffective in the case of very strong instincts. To be of service in any case, it must be so administered as to connect the discomfort closely with the harmful act. *Substitution* is in most cases by far the best method for the teacher's use. Habits of care for pets are the best preventive of cruelty to animals; to divide a class into two groups and give marks to the groups instead of to individuals,—to substitute, that is, team emulation for individual emulation,—may be the best cure for selfish ambition and envy; for a restless class manual work is better than scolding.

Some instincts apparently injurious may have bound up with them valuable traits of intellect and character, and consequently may require encouragement and especially redirection. The annoying questioning of very young children is part and parcel of a general intellectual impulse that is a chief source of mental growth; the disobedience and defiance of boys in their teens, often very troublesome to school and family life, is to some extent at least a necessary accompaniment of the general instinct of independence and mastery which comes at adolescence and which is essential to vigorous manhood; awkwardness and lack of courtesy may be necessary features of a modesty which would suffer if they were artificially overcome.

Individual Differences.—Since individuals differ in the nature and amounts of their capacities and instincts, the particular equipment of each boy or girl, as well as the general fund possessed by human beings as a species, must be allowed for by the teacher. The general capacity for response to visual stimuli gives reason for the tremendous use of visual stimuli in teaching, but if a boy is blind, the right in general becomes wrong in particular. The general instinct of physical activity recommends constructive work, motor expression and the actual manipulation of objects as means of training for almost all young children; but for the few who are relatively lacking in this instinct and possess in abundance the capacity for abstract thought and pure mental gymnastics, the more scientific and intellectual study of objects and ideas and symbols may be better.

Many responses of attitude as well as of action are instinctive; *e. g.*, the interest of babies in living animals, the interests of adolescents in the opposite sex, the general tendency to attend to the novel and the general interest in achievement. These instincts of interest are hard to separate from instincts of action and could well be discussed in connection with them. From the point of view of their application to teaching, however, it is better to describe them in connection with interests in general in Chapter V.

§ 9. *Instincts*

The following instincts are of special importance in school education:—

Mental Activity,—the tendency to be thinking in some way or another, to avoid mental apathy.

Curiosity,—a special aspect of the instinct of general mental activity; the tendency to provoke ideas, especially in the presence of new situations.

Physical Activity,—the tendency to be doing something, to avoid bodily torpor.

Manipulation,—a special aspect of the instinct of general physical activity; the tendency to handle objects, to move them, take them apart, re-unite them, etc., etc.

Collecting.

Ownership.

Sociability.

Emulation.

Kindliness.

Pugnacity and *Mastery.*

Independence and *Defiance.*

Mental Activity.—The instinct of general mental activity is the fountain head of human intellectual development and has been in the past the chief support of school education. Unlike almost all other animals, man thinks not only under the stress of some immediate practical need, but at all times and for the mere enjoyment of thinking,—thinks not only about the few particular objects that feed, warm, protect or injure him, but about everything he experiences. The kitten's intellect restricts itself. to certain smells, sounds and sights that concern food, hunting, play, sleep and the like, and commonly thinks of these only when it is immediately profitable for it to do so. The child watches and listens to all sorts of objects even when they have no meaning for his bodily needs. For to the human being intellectual life is as truly a need as food or safety.

Children do not have to be enticed or forced to think and learn. They seek ideas as eagerly as food. Only when it involves restraint, monotony and futility, is thinking objectionable. The teacher's problem is to preserve the force of the original instinct of mental activity by giving it exercise and by rewarding its exercise with satisfaction, and to guide the aimless, random thinking of children into useful and rational forms.

The greater part of the imitative play of children is a result of this instinct of general mental activity. Playing father, mother, grocer, automobile, church, school and the like is an easy means of arousing trains of thought without strain or fatigue. The amount that children teach each other in the course of such free play is a witness to the value of the instinct and should be a lesson to every teacher.

Physical Activity.—The instinct of general physical activity with its special form, the manipulation of objects,[1] is the original source of sports, industries and arts, and is in childhood the prime ally of intellectual development. As children think for the sake of thinking, so also they move about and handle objects just for the love of action and of the new ideas which action brings. The dog does a few things to a small variety of objects and can become a hunter, eater and carrier; the child does all sorts of things to almost everything and can become a talker, writer, carpenter, violinist and hundreds of things besides.

One aim of the school is to direct the force that makes children run, jump, tumble, dance, wriggle, poke each other, seize and throw, into play and work that shall be healthy for mind and body, and to direct the force that makes children play with utensils, toys and the like toward the arts and industries that have most educative value. Even where the action and manipulation are of no value in themselves they may be desirable as means to intellectual or moral ends. We work against nature when we try to keep young children still. To learn by doing something is to learn with the full help of instinct. And we all know that it is for idle hands that Satan finds mischief.

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[1] So called constructiveness and destructiveness are simply two extreme varieties of the instinct of manipulation.

Until recently the schools left to home and industrial life the development of the instinct of physical activity and sought to repress it in favor of purely mental activity; but with the broadening of the scope of the schools the direction of motor as well as mental habits has been accepted as an aim of systematic education, and with our present insight into the strength of the active tendencies in young children every wise teacher will adopt such methods as to make them allies rather than opponents.

Collecting.—The collecting instinct is instructive as a sample of the neglect of useful natural forces by teachers. Probably not one out of ten teachers of geography enlists this instinct in her service, though it is one of the taproots of interest in natural science. I venture the opinion that the efficiency of the teaching of so-called commercial geography could be increased ten per cent simply by encouraging and systematizing the habits of collecting post-marks, stamps, pictures, samples of soils, agricultural and industrial products and the like.

Pugnacity.—The fighting instinct offers a useful illustration of the general superiority of substitution over repression as a means of inhibiting instincts. If punishing boys for fighting would cure them of it, the instinct would be its own cure, for the fighting itself brings physical pain enough. As we all know, mere repression is here a most uneconomical preventive, whereas the substitution of orderly boxing and wrestling, football, basket-ball and the like, often succeeds admirably. You cannot push the Niagara river back into Lake Erie and keep it there but you can, by creating new channels for it, make it drive the wheels of factories in the service of man. So often with the impulses of human nature.

The Error of Neglect.—Teachers are liable to one of two errors in their attitude toward instinctive tendencies. The first is to neglect instincts both as ends and as means, to add artificial virtues to children instead of cultivating those with which nature has already endowed them and to move children to knowledge and virtue by motives that are logically plausible, in disregard of those which original nature provides in full measure. To this extreme attitude the quiet, obedient lesson learner is the ideal pupil. Physical energy, independence, sociability and pride are rather discountenanced. Talks about the value of education, the needs of later life and the school armament of rewards and punishments are relied on to furnish the energy for school tasks. The instincts of action, curiosity and collecting, of emulation and achievement and mastery, and all the instinctive interests, are looked down upon as too childish motives or, more frequently, disregarded because of ignorance of their power.

To remind oneself that two of the noblest qualities of human nature, courage and maternal affection, are both pure instincts, should be a sufficient warning against despising natural tendencies. As for the childishness of motives based on instincts, in teaching children childish motives are just what must be used. And that these instinctive tendencies furnish the strongest of motives is the plain lesson of school experience.

The Error of Misuse.—The other error is to assume that nature is always right,—that what a child tends naturally to do, that is the thing he should be taught to do,—and to follow instinct regardless of where it leads. But the aims of education require us to lead nature oftener than to follow it; instincts are excellent servants but very dangerous masters. Natural tendencies are sometimes ends in themselves, often most useful means, and always forces that must be taken into account, but to make them the sole guide of education will be a return to savagery.

The right attitude has been described in the first pages of this chapter. It may be summarized in these two quotations:—

> "Respect then, I beg you, always, the original reactions, even when you are seeking to overcome their connection with certain objects and to supplant them with others that you wish to make the rule." (W. James, *Talks to Teachers*, p. 62) [1]
>
> "Hence the transparent infatuation of the cheap advice, 'Trust to your children's instincts.' By all means let us study their instincts, and watch them, and tend them. In them as we have asserted, lie our opportunities. Let us *not* trust them. For this is to forget that the only kind of instinct that is really to be trusted is that educated instinct we call a virtue." (J. MacCunn, *The Making of Character*, p. 29) [2]

§ 10. *Capacities*

The fundamental capacities of human nature are those of:—

Impression, the capacities for sensitivity of the different sense organs.

Expression, the capacities for arousing movement of the different motor organs.

Connection, the capacity to form habits.

Selection, the capacity to maintain and strengthen one mental process in preference to others.

Analysis, the capacity to break up a fact into elements, to think of and react to parts and aspects.

As manifested in actual human life, these fundamental capacities turn into many varieties of special capacities due (1) to the kind of stimulus sensed or the kind of mental fact connected or selected or analyzed (*e. g.*, verbal memory, mathematical reasoning, color vision) and (2) to the mixture of capacity with interest (*e. g.*, honesty, executive ability, self-restraint). Moreover, our common words denoting capacities often refer to complexes of different capacities which together produce some important practical result (*e. g.*, leadership, scholarship, business ability).

The following are some of these concrete special capacities with which school education is particularly concerned:—[1]

The management of things.
The management of men.
The management of concrete ideas.
The management of abstract ideas and symbols.
Self-control.
Energy.
Precision.
Thoroughness.
Originality.
Cooperation.
Leadership.
Self-denial.
Self-reliance.
Refinement.
Sympathy.

The Error of Over-Emphasis.—As usually taught, the studies of the school,—reading, writing, arithmetic, oral and written composition, grammar, appreciation of the content of literature and knowledge of the facts of its history, geography, elementary science, history, algebra, geometry and trigonometry, foreign languages and the special sciences,—give opportunity for the exercise of only the capacity for the management of *ideas*. Manual training and experimental work in science add certain opportunities for the management of things, but the management of men is given little or no scope in the traditional school. The school program and the teacher's methods are in fact both likely to be unfair to the boy or girl gifted in the control of tools and materials and in power to get on with and make use of other people.

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[1] The capacities concerned with sensation and movement are highly important in school life, but the principles of teaching which concern them have been sufficiently emphasized in Chapter II. The very special capacities involved in the special school subjects are not mentioned because the intelligent student of teaching will rarely neglect them and because they would make too long a list.

Moreover one special part of the capacity to deal with ideas, namely, the capacity for thinking with abstractions and symbols, is given greater opportunity than other parts. The mathematics and grammar of the elementary school, and the mathematics and languages of the secondary school are easy and interesting in proportion as one has the ability to think with general and abstract terms and with their symbols. But school is often an uncomfortable, and perhaps an unprofitable, place for the concrete thinker, for the girl who can write poetry but can't parse, or the boy who can tell a good bargain but can't state the principle for solving problems in profit and loss. The school is the paradise for the abstract thinker, for the boy or girl who is able to think with fives and sixes, x's and y's, parallels and perpendiculars, H^2 O's and NaCl's, latitude and longitude, conditions contrary to fact and clauses of purpose. The teacher is usually one who has himself been successful at this sort of thinking and so is more in sympathy with it. He may even thoughtlessly sneer at the mental ability of those who lack it. 'Your son will make a first-rate mechanic or grocer, but he isn't fit for high school,' said such a one. The proper retort would have been, 'Your school, then, is first-rate for one kind of a boy, but it isn't fit for the majority.'

It is true that abstract thought is the capacity which most clearly distinguishes the human from the brute intellect and is the most productive of general progress in civilization, and that every science and art requires more and more abstract and symbolic thinking in proportion as it advances. It is also true that this capacity is likely to stay dormant without systematic education, whereas the ordinary exigencies of life may sufficiently develop the capacity to deal with concrete facts. Still the school is for all, not for the few who have this capacity in large measure; and the school system which aims to serve the greatest good of the greatest number will establish curricula fitted to the concrete thinker and constructor. The wise teacher will also find ways to utilize and develop these capacities, no matter what the curriculum may be.

The Error of Neglect.—School life is likely to neglect also the capacities of originality, self-reliance, cooperation and leadership. Originality is rare and the teacher, in choosing methods well adapted to the majority, is likely to discourage it. Self-reliance is closely allied to contradiction and non-conformity to rules and directions, and the inconvenience of the latter to the teacher may make him over-favorable to a weak docility. The constant study of set lessons in text-books of the usual type aggravates this defect. Cooperation and leadership are common for purposes of mischief in school and play outside, but the traditional ideals of the class—as a company whose sole officer is the teacher, as a peasantry under a czar, or as a set of willing followers of a beloved leader—have led to the waste of opportunity for the cultivation of these important capacities.

Individual Differences.—Individuals differ in the strength of different capacities even more than in the strength of different instincts. Man is a rational animal, but men vary from the stupidity of the idiot to the intellect of an Aristotle. The differences which are so obvious in the case of musical ability, verbal memory or leadership, exist in all capacities. Nature gives each a certain capital; education must learn what it is and make the most out of it. Exactly the same results must not be expected from any two children in a class. Some children will succeed with a study no matter how poor the teaching, and some children, no matter how good the teaching, will fail. The presence of capacities gives the possibilities of instruction and their amount sets limits to what instruction can achieve.

These individual differences are further complicated by the specialization of capacities. The boy who differs from his fellows by a surplus of the capacity to reason about numbers may show a deficit in the capacity to reason about grammatical forms. The specially good observer of birds may be an inferior observer of the spelling of words. Nature's endowment to an individual is in the form of scores of special gifts, some of which may exist in large measure, others in small. The teacher does not teach bright, mediocre and dull pupils, but a group of individuals each of whom possesses varying degrees of ability in different subjects and in different aspects of the same subject. There is, it is true, a general and fairly high correlation between many capacities, so that excellence in any one is somewhat prophetic of excellence in many others. But it is only somewhat; excellence in one is rarely prophetic of equal excellence in others. Only rarely is a pupil found who is at the top in everything; only rarely must a teacher endure a pupil who is proficient at nothing.

It is then unscientific and unjust for a teacher to neglect a pupil because of lack of capacity in, say, the beginning reading and writing of the primary classes. In more than nine cases out of ten there is something worthy of learning which the pupil can learn well. To prescribe the same studies for all is at best a necessary evil. To make promotion depend upon any one study is to retard the progress of many pupils of high average capacity.

SUMMARY

What anyone becomes by education depends upon what he is by nature. Teaching is the utilization of natural tendencies for ideal ends. The first condition of a pupil's responses is the fund of instincts and capacities given by nature; the first step in teaching is to consider and allow for them. Good teaching discourages no worthy instinct or capacity; selects and strengthens the good by giving them exercise and rewarding them with satisfaction; eliminates or weakens the bad by disuse, substitution, and, but less often, by repression; economizes effort by not teaching prematurely what will come soon enough as a delayed tendency, and by not trying to eliminate what will pass away by itself. Good teaching so arranges the work of the school that a wide range of capacities may be utilized, and that instinctive activities and interests may make for intellectual and moral progress. Good teaching expects and adapts itself to wide individual differences in original nature.

§ 11. *Exercises*

1. Which of the following tendencies does school-life usually develop overmuch? Which does it too often neglect?

Aesthetic appreciation.
Constructiveness.
Cooperativeness.
Courage.
Display.
Envy.
Imitation.
Memory.
Rivalry.
Self-reliance.

2. Are the present arrangements of reading and writing in the curriculum most likely to err from relying on delayed instincts too soon or from appealing to transitory instincts too late?

3. How would you explain the fact that of a group of people who were asked what they enjoyed most as children in school a large percentage replied, 'Distributing pencils,' 'Going on errands,' and the like?

4. What instincts would be likely to remain dormant in a girl who never had younger children to care for? In a boy who was brought up in isolation from other boys?

5. Give an illustration of either ingenious use or wise direction of each of the following instincts and capacities:—

The instinct of manipulation.
“ “ “ love of out-door life.
“ “ “ affection.
“ “ “ ownership.
The dramatic or personating tendency.
The capacity for rote memorizing.
“ “ “ concrete learning.
“ “ “ drawing.
“ “ “ productive imagination.
“ “ “ observation.
“ “ “ leadership.

6. Name two or more channels into which the energy of the hunting instinct may be profitably turned.

7. Name five or six of the impulses which cause truancy. Which of these are due to instinctive tendencies?

8. How might the migratory instinct,—the tendency to roam and explore,—be made a positive help to school work?

9. Name an instinct of special help in nature-study.

10. Name an instinct of special help in manual training.

11. What is the effect on instinctive curiosity of attracting a child's attention by such questions as 'What do you suppose I'm going to do now?' followed by doing nothing new or specially attractive?

12. Which would you rather be, the child who asks such questions as 'Where were all the rocks before they were in the dirt?' and 'What does the rain do when it isn't raining?' or the teacher who makes fun of him for doing so? Why?

13. Give illustrations of children's questions that show silliness and support Bain's statement that, 'Much of the curiosity of children......is a spurious article. Frequently is a mere display of egotism, the delight in giving trouble, in being pandered to and served. Questions are put, not for the desire of rational information, but from the love of excitement.' [3]

14. Give illustrations of children's questions that show the opposite.

15. Illustrate the employment of the instinct of general physical activity (a) in the service of geography; (b) in the service of history.

16. To get rid of envy, jealousy, cheating, etc., due to rivalry for marks, one teacher abolished the marking system altogether; another divided the class into two groups and kept only the scores of the two groups; a third teacher made a speech about the wickedness of envy and adopted rigid rules against cheating. Which do you

think had the best permanent effect on the tendency to personal rivalry? What names would you give to the three methods?

17. Name two capacities which the usual college preparatory course in the high school emphasizes. Two which it neglects.

18. From the point of view of instincts and capacities what would be the advantage of partial self-support as a feature of the education of boys from sixteen to twenty-two?

19. Supply appropriate words in the following: The most frequent faults of teaching with respect to intellectual capacities have been:— To appeal to——instead of to comprehension; to imitation instead of to——.

20. What capacities are especially involved in learning geometry? In learning science?

21. Compare physical with commercial geography with respect to the instincts and capacities to which they appeal.

22. Compare similarly the history of changes in government, the history of wars and the history of changes in social and industrial life.

23. Compare similarly the computation work of arithmetic with the work with concrete problems.

24. Name three games which give good opportunities for training in cooperation. Three which give little or none.

25. Which capacity develops earliest in life, musical capacity, literary ability or business ability?

26. State two questions about instincts and capacities which a teacher might properly investigate in the case of her class.

27. What are some questions about instincts and capacities not answered by this chapter the answers to which would interest you?

28. Explain or illustrate each of the following quotations:—

'The destructive tendency is probably only a modified form of the constructive.' [4]

'Education is the revealer of inequalities for which it is not responsible.' [5]

'In man, even within the domain of one and the same instinct, there is a possibility of widely different developments.' [6]

'Education ought then to be both an excitant and a restraint.' [7]

29. Which of the following statements are true? Which are false? Which are partly true and partly false? Defend your opinion in each case.

'The irrepressible life in children must be used as the chief motive-power in education.' [8]

'Men at their birth are by nature radically good.' [9]

A sinful nature has given each of our children more than seven times seven devils.

'Nothing can be more unwise than to tell a child he *must never* fight.' [10]

The child seeks 'decidedly and surely that which is in itself best; and, moreover, in a form wholly adapted to his condition.' [11]

Knowledge is to be considered as the food of the mind.

Knowledge is to be considered as a gymnasium for the mind.

'Most children enter school for the first time with minds athirst for knowledge.' [12]

'It behooves us to study nature's plan, and seek rather to aid than to thwart it. For nature must be right; there is no higher criterion.' [13]

'These instincts, then, which every child has, although in varying form, and vigor, must be turned into worthy grooves. Not suppression, but a generous control!' [14]

§ 12. *Self-Activity*

The last four sections should have made it evident that the result of educational endeavor depends as truly upon the nature of the individual taught as upon the nature of the tuition given him. The activity from without in the shape of the words and acts of teachers, the lessons in books and the like, cooperates with the activity from within in the shape of the instincts, capacities and individual qualities of the pupils. In the last analysis what the scholars do, not what the teacher does, educates them; not what we give, but what they get, counts; only through their self-activity are they directly changed.

Education should be considered not as a moulding of perfectly plastic substances, nor as a filling of empty minds, nor as a creation of powers; but rather as the provision of opportunity for healthy bodily and mental life, of stimuli to call forth desirable activities in thought, feeling and movement, and of means for their wise direction, for the elimination of their failures and futilities, and for the selection of their useful forms.

This general point of view may be called the doctrine of self-activity. It may be stated briefly as follows: Nothing really counts except as it influences the pupil's own responses; to encourage healthy life, to stimulate to mental activity and to select the best of such activities is the teacher's work.

That the teacher must educate pupils by means of their own activities does not, however, mean that what a pupil does of his own accord is right. The teacher must constantly stimulate certain acts and prevent others;

must perpetuate some and eliminate others. Nor does self-activity include only such obviously active responses as the unaided discovery of facts, the invention of processes, the undirected working out of arguments. To learn by mere imitation and to commit to memory are activities as true, though not so pronounced, as original discovery. They have their place, though not so high a place, in education.

Least of all should anyone confuse self-activity with bodily activity, or take responses to mean only gross physical movements. The child who sits quietly absorbed in solving a problem is more active and more truly active than his neighbor in the next seat who is jumping up and down with glee at getting the answer. The activity of thought indeed often involves the cessation of many bodily actions.

Finally, activity may as well result in the inhibition as in the production of ideas and feelings and movements. A fifth grade school-room in which children sit quietly reading or move about in a business-like way may represent more real activity than a room in which the children are waving their hands, incessantly making comments and asking questions. The first room may, it is true, represent mere repression and absence of interest and work; but it may represent interest, thought and work *plus the inhibition of aimless expressions thereof.* It must not be forgotten that *not* to think the foolish, irrelevant thought is the essential of reasoning; that *not* to follow the wrong impulse is the essential of character; that *not* to make the aimless and crude movement is the essential of skill. Success is in great measure not making failures. What a man does depends upon what impulses are neglected or overcome. We are what we are by reason of what we are not,—what we do not permit ourselves to become. Activity is inhibitory as well as impulsive.

Under the topic, *Self-Activity*, books on education often treat of the value of experiment and inference by pupils in comparison with information-giving by the teacher, of so-called developing methods in comparison with the study of conclusions as stated outright, and of reasoning in comparison with learning by rote. These and other similar matters are, however, better studied in connection with the special topic, *Reasoning*, in Chapter X.

SUMMARY

The nature of the pupil as well as the nature of the stimulus decides his response. To arouse, direct and select from his responses is the work of the teacher. Responses of perception, absorption, memory, imitation and the like are useful, though not so worthy as responses of reflection, reasoning or invention. Activities of neglect, inhibition and guidance are even more important than activities of impulsion.

For Further Reading

W. James, *Talks to Teachers on Psychology*, Chapters III-VII inclusive.

E. A. Kirkpatrick, *Fundamentals of Child Study*, Chapters III-X inclusive, XII and XIV.

CHAPTER IV

APPERCEPTION

Preparatory, *Elements of Psychology*, §§ 35-37, 42-45, 50

§ 13. *The General Law*

The general law of association and its supplement, the law of analogy or assimilation, teach that what any pupil thinks or feels or does on any occasion depends upon what he has thought and felt and done in the past and upon the present 'set' or tendency of his mind. He will respond to any stimulus in the way that he has responded to it or to some stimulus like it with resulting satisfaction. A mind's past experience and present content determine its responses. Just as education must at the start build on instincts and native capacities, so at each future step it must build on previous experience and pay heed to present conditions. If the knowledge or power needed as a preparation for the task in hand is lacking, the teacher's first duty is to secure it. This is the law of apperception.

Except in so far as unlearned tendencies of themselves provide proper responses, every act of teaching is subject to this law. To observe an object aright, the student must know certain facts about it and about what he is to look for; to attend to a lesson properly he needs to know its aim and to have knowledge with which it makes connection; to comprehend an argument he must have had training which impresses the pertinence of its steps; to be remembered a fact must have found a place in his system of thought and knowledge; to reach a conclusion properly he must have had the data; to acquire a certain technical skill in hand work he must have reached the necessary point of motor development.

To proceed from the known to the related unknown, from rough preliminary knowledge to detailed and adequate knowledge, from simple facts to complex facts depending on them, to teach one thing at a time,—are rules each referring to one aspect of the general law of apperception. As nine-tenths of human life and learning illustrates the general law of association, so nine-tenths of teaching illustrates the use or abuse of the law of apperception. The teaching of reading depends largely upon knowledge of spoken language and of common things and events; the teaching of algebra relies upon knowledge of arithmetic; the teaching of multiplication, upon knowledge of addition; the teaching of the geography of North America, upon experience of the physical features of the neighborhood; a child's attitude toward his teacher depends upon his experience with previous teachers; appreciation of literature requires knowledge of the meanings of words. The past is everywhere the key to the present.

§ 14. *Detailed Applications: Exercises*

The student should have gained a thorough knowledge of the meaning and scope of apperception in the learner (that is, of the laws of association and analogy or assimilation) from the study of dynamic psychology.[1] To give full realization of apperception as a principle of teaching and to form the habit of judging the value of every stimulus, not by what it is in itself, but by what it will be to the pupil or class, is the aim of the exercises that follow.

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[1] The references under 'Preparatory' will provide this knowledge and prepare the student for the exercises.

1. How would a ten year old boy brought up in an American city probably interpret 'He gave him two guineas'?

2. How does your own previous experience or so-called 'apperceptive mass' influence your answer?

3. Give an illustration from school life of a mistake due to the lack of proper previous experience.

4. Give one due to the presence of unsuitable present content.

5. A teacher in New York City took a class to Riverside Park (situated along the Hudson River) showed them the river, called attention to its size and then said, 'Now tell us the name of this great river.' 'The Amazon,' was the prompt reply! What would you suggest as a possible explanation? What precautions would it be wise for that teacher to take on another similar excursion?

6. It is hard to realize the lack of knowledge of pupils. Can the reader believe, for example, that a bright girl, a graduate of the grammar school, was greatly surprised to see apples growing on trees or that an intelligent eight-year-old boy in a city of over twenty thousand inhabitants was doubtful as to whether some coins given to him were pennies or nickels? Give two or three similar instances.

Experiment 2. Write without help answers to the following questions:—

What is the price of a ton of good hay?
How many members has the House of Commons?
What is the pituitary body?

How big is a scallop?
What is the shape of a tomato leaf?
Which way do the seeds in an apple point?
What is a dumb-waiter?
What is the opposite of 'if'?
What does this mean, 'He is going to take the L'?
What is sold in a delicatessen shop?

Compare your answers with the right ones. Should these questions be much harder for you than the following would be for a six-year-old entering school?

How long is two feet?
How many legs has a pig?
Where is your heart?
How big is a cow?
What is the shape of a pine tree?
Where does the sun rise?
What does a baker do?
What does rich mean?
What does this mean, 'He went away up the mountain'?
What grows on a farm?

Experiment 3. Arrange with some one in a country school, and also with some friend in a city school, to test one by one eight or ten children in the lowest class as follows and record their answers. Compare the two groups.

How big is a loaf of bread?
" " " a horse?
" " " a cow?
What does a teacher do?
" " a policeman do?
" " a farmer do?

Experiment 4. Have your two friends also each read to eight or ten children in the second grade of the school (it will be better to take them apart one at a time, but this is not absolutely necessary) selection A, without comment and have them draw pictures to tell the story. Let the story be read twice. Compare the drawings of the two groups. State briefly how their drawings illustrate the fact of apperception. Make the same experiment with selection B.

A.

One day a fox came out of the woods near our house, and tried to catch a hen in the barn. But the hens saw him and made a great noise. Hero was in the yard, and he ran into the barn and drove the fox off. Hero did not catch him, but he barked so loud that the fox ran for his life back to the woods. He did not get one of our hens for his dinner that day. Is not Hero a good dog? [15]

B.

Carl was a little lame boy. He lived in an attic with his mother. He used to look out of the window and watch the boys at play. He could see the men and the women and the horses and wagons in the street. One day there was a little baby playing in the street when the trolley car came around the corner. She was on the track right in front of it. Carl gave a scream, for he was afraid the baby would be run over. But just then a big dog ran out into the street, took hold of the baby's dress with his teeth and carried her back to the sidewalk to her big sister.

7. How does the principle of apperception apply to teaching the spelling of compound words?

8. Make an argument of about one hundred words on the basis of the law of apperception in favor of beginning the study of geography with home geography.

9. In what respect would this law support the practice of beginning United States History with the discovery of America by Columbus and following the order of time?

10. In what respect would it support the opposite

practice of beginning with an account of the nation as it now is, giving next a brief picture of national life 'when your fathers and mothers were little boys and girls,' giving next a brief picture of the nation a hundred years ago and then one of the nation in 1700, and only then passing to the early voyagers and colonists and tracing events and changes in conditions of life in chronological order?

11. What is the previous experience necessary before the definition of a pronoun can be taught properly?

12. What argument for stating clearly the aim of a lesson do you draw from the principle of apperception?

13. What argument for the use of reviews?

14. Considering a review lesson from the point of view of apperception alone, which facts should be reviewed?

15. How does the fact of apperception help to account for the relatively inferior teaching of substitute teachers?

16. What is the experience or apperceptive basis necessary for the comprehension of the meaning of such words of relationship as *this, which, nevertheless* and *its?*

17. Of the two factors which determine a pupil's response, (a) his previous experience of the stimulus and of other stimuli like it and (b) the temporary 'set' of his mind, which has the greater influence?

18. Which is influenced by stating the aim of a lesson?

19. Why is it often not a loss of time to ask questions which every member of the class is able to answer?

20. Give two or more illustrations of gross neglect of the mental content of a pupil such as the following: " 'Will you please tell me why I carry one for every ten,' said little Laura to her instructor. 'Yes, my dear,' said

she kindly. 'It is because numbers increase from left to right in a decimal ratio.' "[1]

In the case of teaching about the physical world as in physical geography, physics, chemistry, botany, zoology, human physiology and the like, the first hand observation of the objects themselves is the experience necessary to adequate knowledge of their structure, properties, relations and actions. Without such an apperceptive basis, there is a high probability that the knowledge gained will not connect with reality or modify responses to actual situations of life and there is some danger of its being exclusively verbal.

21. Apply this same principle to the question of the use of 'sources' in history.

22. How then would you teach the fact of the transportation of soil by water?

23. Apply the principle of the above paragraph to the teaching of the tables of weights, measures and foreign money.

24. What would be advisable as preparatory lessons before giving a book-lesson on the constitution of water? By what would you replace the book-lesson if you were unfettered by practical limitations?

25. What would be your first steps in teaching a class the function of the cotyledons of the bean?

26. In teaching the structure and action of the human heart?

27. Name five cases in which first hand acquaintance with the things themselves is out of question?

28. Name five cases such as the study of bacteria in the high school where the practical difficulties of giving direct acquaintance with the object to be studied outweigh the advantages.

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[1] The author regrets that he is unable to give the source of this charming illustration of the frying pan and fire in teaching.

29. Illustrate the profitable use of a school museum; of school excursions; of demonstrations of experiments in elementary science; of a school garden.

In emphasizing the importance of paying heed to the past experience and present frame of mind of a pupil, one is likely to forget that we pay heed to them only in order to add to them. Good teaching will fit its stimuli to the pupil's knowledge, but only in order to increase it; good teaching will work on his actual present tendency, but only to improve it. In the familiar recommendation, *To proceed to the unknown* is as important as *from the*

A.

CLASS WORK.

Talk about things of which the pupils can see two of a kind,—as two hands, two boys, etc.

Let the pupils name objects of which they see two of a kind.

EXAMPLES: "I see two boys; I have two feet; here are two sticks."

"How many sticks have I here?" ("One.")

"How many in my other hand?" ("One.")

"Now how many?" [Putting them together.] ("Two.")

"Then one stick and one stick are how many?"

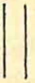
"One and one are how many?"

Illustrate in the same way with balls, pencils, nails, and other objects.

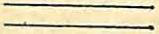
"I strike the bell once; I strike it once again. How many times did I strike it?"

SEAT WORK.

Make two lines on your slates, thus:



Make two lines, thus:



Make two dots, ● ●

Make two rings, ○ ○

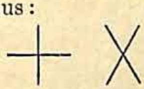
Make two stars, ∗ ∗

Put two dots together like these ⁚, or these ⋱, or these ⋰.

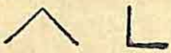
Put two stars together in the same way.

Put two rings together in the same way.

Make two lines cross each other, thus:



Make two lines meet each other, thus:



known. To simply review the known, to elaborate at length what pupils have long been familiar with, is a more harmful violation of the principle of apperception than to overwhelm them with facts which they cannot assimilate. Incomprehensibility is no worse than monotonous repetition. Indigestion is not so bad as starvation.

30. What do you think of giving as the first work in arithmetic fourteen pages of such drill on the number 2 as is exemplified in A.?

31. Collect from text-books four or more illustrations of the sort of violation of the principle of apperception mentioned in the paragraph preceding Question 30. State wherein each one violates the principle.

For Further Reading

W. James, *Talks to Teachers on Psychology*, Chapter XIV.

J. Adams, *Herbartian Psychology Applied to Education*, Chapter III.

C. A. McMurry and F. M. McMurry, *The Method of the Recitation*, Chapter VI.

CHAPTER V

INTERESTS

§ 15. *The Meaning of Interests*

When any situation arouses attention, that is, leads the mind to busy itself with the thing or idea or feeling, it is called interesting. The tendency to devote one's thought and action to a fact is called interest in it. The feeling of arousal, of mental zest, of being drawn to the fact, is called the feeling of interest.

With the fact and feeling of interest education is concerned in two ways: First, it must be the aim of education to encourage and create desirable and to discourage and destroy undesirable interests. From this point of view interests are an end. Second, we depend upon interests to furnish the motives for the acquisition of knowledge and for the formation of right habits of thought and action. From this second point of view interests are a means. Thus the interest in nature, in our physical surroundings and in animals and plants, the interest in bodily health and vigor, and the interest in truth, are ends for which education strives. Thus the interests in bodily movement and the interest in ownership are means by which children are led to gain skill and effectiveness in constructive work, drawing, cooking and the like.

This distinction is important, for a majority of the errors made in teaching with respects to interests are due to confusing means and ends.

Interests may be native or acquired. Many human instincts are unlearned tendencies not to do something, but to take attitudes of interest or aversion. There are, that is, instinctive interests or instincts of interest. Many human habits are habits not of out and out thought or action, but of attitude, of interest and aversion. In general, then, the educational principles based on the psychology of instincts and habits are applicable to interests as well.

§ 16. *Interests as Ends*

The Control of Interests.—Not all natural interests are desirable. To destroy the interest in coarse excitement is as necessary a work as to develop the interest in good reading. As with all instincts and habits, nature's tendencies are not safe guides to education's ideals. The destruction may be, as with all instincts, by giving the undesirable interest no chance for exercise, by forming the habit of meeting in some other way the situation concerned, (*i. e.*, by substitution or redirection), and by actual repression by discomfort. Desirable interests are perpetuated, of course, by furnishing the stimuli that arouse them and by rewarding them with satisfaction. The capital with which an individual starts is the native interests, the instincts of interest in movement, novelty, color, action, living animals, excitement, rhythm, the opposite sex and the like. The problem is to select for continuance the good and to graft the interest to be acquired upon some interest already present, or rather to develop out of some interest already present the one which we seek. Thus from the interest in constructing a boat may be developed an interest in making accurate measurements; from the interest in action and excitement a wise school system gradually obtains an interest in history and literature.

Three Causes of Interest.—Much assistance is given to the teacher in this process of refining and redirecting interests, by three facts. The first is the general law of association that whatever tendency brings satisfaction will be perpetuated and strengthened. Whenever an interest is made to profit a pupil, it will be preserved. Connect any response with an original or acquired satisfier and it will satisfy. The hardest sort of bodily labor becomes interesting when it gives a boy a place on the football team or connects with the excitement and achievement of hunting big game. The second is the force of imitation. What the community cares about will interest each new member; the teacher who is interested in a subject will infect her class. The third is the fact that knowledge breeds interest, that, with certain exceptions, the power to handle a subject produces in the long run an interest in it, uninteresting as it may have been at the start. As soon as the high-school pupil can really read German, he is likely to gain an interest in it.

Errors in Teaching.—In cultivating interests the chief danger is in mistaking one for another and so getting the wrong one. The boy may be thought to play football because of an interest in bodily perfection and athletic sport when his real motive is the interest in seeing his name in the paper, being applauded by large audiences, and being admired and envied by his fellows. The girl may be thought to possess a real interest in knowledge when her efforts are really only to beat Mary who failed to graduate.

The chief defect of school instruction with respect to the acquisition of interests is that, as a consequence, they are not permanent. Interests are present under the stimuli of school life which die out soon after it is completed. As children we learn, but as adults we too often lose our love for learning: the higher feelings are nourished in the protected surroundings of the college, but do not long survive the transfer to the rougher outside world and competition with the interests in money, power and position.

§ 17. *Interests as Means*

All Work Implies Interest.—To a normal boy or girl physical or mental work without interest is an impossibility. When one does the most uninteresting work he still does it from interest,—interest in the avoidance of punishment, in maintaining his standing in class or in preserving his self-respect. Interest of some sort there must be.

The problem of interest in teaching is not whether children shall learn with interest or without it; they never learn without it; but what kind of interest it shall be; from what the interest shall be derived.[1] There need be no quarrel between those who say all work should be made interesting and those who say all proper work should be done whether it is interesting or not. For both statements are true. The actual difference of opinion is about whether we should in large measure derive interests in school work from the common instinctive interests in play, action, novelty, emulation and the like, or should derive them from the abstract and rare interests in duty and knowledge. The latter interests are the higher and if they are present it is well to appeal to them. But in actual school work the choice is commonly not between the common instinctive interests and these higher ones,—not between, for instance, curiosity and love of pure truth,—but between one common interest and another, between, for instance, curiosity and fear of punishment.

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[1] When an individual is attracted by the intrinsic qualities of the work his interest may be called *immediate* or *intrinsic;* when the work does not interest him in and of itself but only by its consequences or connections, the interest is called *derived.*

Practical Precepts.—The practical rules are simple: Having decided what an individual or a class ought to learn, arouse as much interest in it as is needed; get interest, but derive it from the best interest available. Other things being equal, get interest that is steady and self-sustaining rather than interest that flags repeatedly and has to be constantly reinforced by thoughts of duty, punishment or the like. Get the right things done at any cost,—but get them done with as little inhibition and strain as possible. Other things being equal, work with and not against instinctive interests.

There is in reality not so much conflict between what children ought to learn and what is interesting to them as we often imagine. It is true that their interests in crude excitement, novel sensations, silly plays and the like work against their true progress, but it is also true that *our* failure to enter into the spirit of child-life, our neglect of their real needs, the unfitness of many of our methods to employ and interpret their intellectual life work equally against their true progress. To choose as the subject matter of instruction facts which are as remote from any real demands of a child's intellect as the geometry of a space of n dimensions is from any real demands of our own and then to seek to conjure up an interest in them is a poor solution of the problem of interest. One factor that should decide what children ought to learn and do is adaptation to the intellectual and practical needs which the children can then and there appreciate; and this factor is also a chief determinant of their interests.

"And so has come up the modern theory and practice of the 'interesting,' in the false sense of that term. The material is still left; so far as its own characteristics are concerned, just material externally selected and formulated. It is still just so much geography and arithmetic and grammar study; not so much potentiality of child-experience with regard to language, earth, and numbered and measured reality. Hence the difficulty of bringing the mind to bear upon it; hence its repulsiveness; the tendency for attention to wander; for other acts and images to crowd in and expel the lesson. The legitimate way out is to transform the material; to psychologize it—that is, once more, to take it and to develop it within the range and scope of the child's life. But it is easier and simpler to leave it as it is, and then by trick of method to *arouse* interest, to *make* it *interesting;* to cover it with sugar-coating; to conceal its barrenness by intermediate and unrelated material; and finally, as it were, to get the child to swallow and digest the unpalatable morsel while he is enjoying tasting something quite different. But alas for the analogy! Mental assimilation is a matter of consciousness; and if the attention has not been playing upon the actual material, that has not been apprehended, nor worked into faculty." (J. Dewey, *The Child and the Curriculum,* p. 38.) [17]

False Views of Interest.—It is a common error to confuse the interesting with the easy and to argue that the doctrine of interest is false because it is wrong to make everything easy. This is an error because in fact the most difficult things may be very interesting and the easiest things very dull. Walking, scribbling and nodding are not more interesting than running, drawing pictures and making up faces. Indeed difficulty is of itself rather interesting than otherwise.

The real facts are that work at which one utterly fails, with which one makes no headway, is commonly uninteresting, that the same thing becomes easier to an individual when attacked with interest, and that to any individual those lines of work for which he possesses capacity are commonly interesting.

Two things may be meant when a study or lesson is called hard; (1) that it is generally so regarded and (2) that the individual doing it finds it hard. It would be a cowardly principle of teaching to omit work merely because it was hard in the first sense. But it would equally be the height of folly to despise an individual's work merely because *he* found it easy. The obvious course is to face bravely the tasks that are commonly esteemed hard and then do everything that can properly be done to make them as easy as may be.

A second common error is to confuse the feeling of interest with pleasure and to argue that we cannot make school work interesting because some necessary features of it simply are not pleasurable. It is of course true that many things must be done by a school pupil which produce no pleasure, but they may nevertheless be done with interest. A tug of war and putting up the heavy dumbbell the fiftieth time are definitely painful, but may be very interesting.

A third common error is to over-estimate the strength of children's interests in abstract thinking such as characterizes the logical aspects of arithmetic, formal grammar, deductive geometry and the syntax of foreign languages. In high schools where the pupils represent a selection of the more capable and scholarly, the teacher may depend upon a fair amount of the interest in mental gymnastics, in thought regardless of its content. But even in high schools this interest will be slight in a majority of cases and in the grammar school it is never safe to depend on it as a motive for a class. For the majority of all minds and the great majority of untutored minds demand content, mental stuff, actual color, movement, life and 'thingness' as their mental food.

There are two failures of teaching with respect to interest. The first is the failure to arouse any mental zest in a class, to lift the class out of a dull, listless, apathetic good behavior or keep them from illicit interests in grinning at each other, playing tricks, chewing candy and the like. This we all recognize as failure. The second type succeeds in getting interest, but the interest is in the wrong thing. Many classes sit entranced as the teacher shows them pictures—they are thoroughly interested and attentive—but they have no interest whatever in the principle or fact which the pictures are to illustrate. A lecturer can always get interest by telling funny stories, but again and again he will find that the real content of his lecture has been entirely neglected. Too often the picture, the story, the specimen or the experiment removes as much interest from the lesson itself by distracting the pupil as it adds by its concreteness, life and action. It is never enough to keep a class interested. They must be interested in the right thing.

SUMMARY

Some interests are ends; all interests may under proper circumstances be used as means.

Good teaching perpetuates desirable instinctive interests, using the same methods as in the case of instincts, and creates interests in facts that are not originally attractive by connecting them with facts that are. Its goal is interests in these facts for their own sake.

Good teaching decides what is to be learned by an appeal not to interest, but to the general aim of education. Having so decided, it secures interest—the most, the best and the steadiest possible. Other things being equal it uses instinctive rather than artificial interests and common rather than rare interests. It is ever on the watch against mistaking one interest for another.

§ 18. *Exercises*

1. Name two or three interests which are ends in education.

2. Name two or three interests which are only means.

3. Illustrate the development of the interest in other people (the so-called social instinct) as an end.

4. Illustrate its use as a means in teaching history. In teaching German.

5. (a) Of the interests mentioned below name five that are largely instinctive. (b) Two that are largely acquired. (c) Two that are long delayed. (d) Three that appear early in life and also stay late. (e) Three that education should commonly weaken. (f) The two that are commonest. (g) The two that are rarest. (h) Three that are risky as motives in school.

In excitement.
In getting money.
In mechanical contrivances.
In moving rather than still things.
In the other sex.
In romance.
In adventure.
In living animals.
In one's personal affairs.
In society.
In novelty.
In music.
In rhythm.
In ownership.

In abstract thinking.
In adornment.
In the stock exchange.
In philosophy.

6. What sentence in the text is illustrated by the following? To develop good interests in art one should surround young children with pictures that not only are of artistic merit, but also possess the qualities of action, color or story-telling and which deal with subjects which children care about.

7. How would you develop an interest in chemistry out of an interest in cooking?

8. What common interests of boyhood might be used as a starting point for or reinforcement of the interest in chemistry?

9. Business men complain that the graduates of the schools can rarely write an effective letter. Pupils complain that composition is dry and uninteresting work. The same pupils who show little interest in school tasks often become absorbed in the serious study of some trade or profession as soon as they have decided to make it their occupation in life. Putting the three facts just mentioned together and recalling the first of the three aids to teachers in redirecting interests, arrange a plan for securing interest in composition writing in the high school.

10. What is the danger in relying exclusively on artificial motives, external rewards and punishments, trusting that when sufficient knowledge has been gained an interest in the subject itself will develop?

11. What interest is added to a subject for a student when he chooses it himself instead of being compelled to take it?

12. How would you cure a boy of an interest in

cheap blood-and-thunder stories? Of an interest in display, in 'showing-off'?

13. What do you think makes the stories of *Cinderella*, of *Little Red Riding Hood* and of *The Three Bears* so interesting to small children?

14. How would you explain the following case of marked interest in what most people would call an uninteresting thing? 'I have seen a roomful of college students suddenly become perfectly still, to look at their professor of physics tie a piece of string around a stick which he was going to use in an experiment, but immediately grow restless when he began to explain the experiment.' [18]

15. The interests in the concrete and in action can often be made of service in the most abstract subjects; *e. g.*, paper-folding is of help in learning geometry. Illustrate the same general fact in the case of learning the forms of the letters.

16. Illustrate the wise use of each of the following interests as a means to gaining knowledge or skill:—The interest in ownership. The interest in money-making. The interest in living animals.

17. Name three interests which contribute to make pupils eager to know their marks. Which of these are desirable, and which undesirable, interests?

18. What would be the advantage of repeating a test (without warning, of course) after a month and giving to each pupil as a mark the amount of gain made over his record of a month before?

19. Illustrate the wise use of the dramatic instinct in the primary school. In the high school.

20. One of the strongest of human tendencies is to resist being balked or frustrated in the execution of any impulse after one has begun to act upon it. Give cases

of difficulty in managing children due to failure to make allowance for this tendency.

21 How could you utilize the interest of high-school boys in inventions and mechanical contrivances?

22. How might you perhaps utilize their interest in strength and bodily symmetry as an aid in the study of Greek? In the study of physiology?

23. Name one result on school work of each of the following interests of adolescence? The interest in the other sex. The interest in self-direction, in being one's own master. The interest in religion.

24. Which of the two following lists of topics for compositions is the better adapted to secure the interest of high-school classes?

A Canoeing Trip.
How to Choose a Bicycle.
Spring House-cleaning.
The Appearance of Church on Easter Sunday.
The Prospects of our Base-ball Team.
Nursing as a Profession.

The Duties of a Full-back.
Building a Boat.
The Construction of a Shot-gun.

25. Consider the characters presented to students for emulation in school courses in history and in reading-books, from the point of view of your answer to question 24. What changes are needed to secure better adaptation to the interests of all students?

26. What interests are appealed to by a mental arithmetic recitation?

27. In what per cent. (roughly) of high-school pupils does geometry really appeal to the interest in pure reasoning?

28. Some one has said that we should study Latin to know how the Romans thought and felt. From what

interests does the high-school pupil usually study Latin?

29. When is it justifiable (or least objectionable) to use a bad interest as a motive for school work?

30. What was Miss Bessie's error in the teaching described in the following?

"It had seemed to Miss Bessie advisable that the 'children should know something of the world on which they live,' and for purposes of instruction she had selected a geyser and a volcano as important—not to say interesting—features of land structure. By means of a rubber ball with a hole in it, artfully concealed in a pile of sand, she had created a geyser, and with a bit of cotton soaked in alcohol and lighted she had simulated a volcano.

"We began our work with geography in ignorance of these facts. After a few lessons on hills, mountains, islands, capes, and bays, the children informed us that they 'didn't like those old things.' 'Please, won't you give us the fireworks?' asked Freddie. 'Or the squirt?' added Agnes eagerly." [19]

Experiment 5. Ask the children of a third or fourth grade class each to draw a picture of whatever they like. Examine their drawings. What is the predominant interest, in technical ability, in ornamentation, in making the drawing pretty or in expressing facts?

Experiment 6. (a) Spend a Saturday afternoon in the reading-room of a public library or Young Men's Christian Association building. Make a plan of the room, locating the different magazines. Observe and record in the case of each boy from fifteen to eighteen years of age, which magazine he looks for first and which second (in case the first choice is in use). State briefly the facts you observe and the conclusions about the interests of boys of the high-school age which you draw from them.

(b) If the above is impracticable, get some friend to ask the boys of a third or fourth year high-school class to each cross out from the list given below the names of those magazines about which they know nothing and then to mark the most interesting of those left (1) and the next most interesting (2).

McClure's Magazine.
Outing.
The Scientific American.
The Youth's Companion.
Forest and Stream.
The Century Magazine.
Boyhood.
Life.

State briefly the facts and conclusions as in (a).

Experiment 7. Which of the three selections, A, B and C, is the most interesting to children in the second year of school? What accounts for its superiority?

Pick out the least interesting features of each selection. State why they lack interest.

Discuss each selection briefly (in from thirty to fifty words) from the point of view of interest.

How did you decide which was the most interesting? What would be the best way to decide?

A.

MR. LONGFELLOW

This is a picture of Mr. Longfellow.
He was the boy who lived near the sea.
He is an old gentleman in this picture.
He still loved the birds and flowers.
His heart was always kind.
He was a poet.
A poet has beautiful thoughts.
He writes them for others to read.
His thoughts make people better.
When he was a boy he went to school.
Then he went to Bowdoin College.
Bowdoin College is in Maine.
He then went across the ocean.
He spent four years in other countries.
When he came back he was a teacher in Bowdoin College.
He lived afterwards in Cambridge, Massachusetts.
He went there to teach in Harvard College. [20]

B.

KING TAWNY MANE

Here is a fable that comes to us from India. It has amused the children of that country for a great many years; and, while you are trying to find the lesson which it teaches, it may also amuse you.

2. There was once a lion whose name was Tawny Mane. He was so strong that all the other animals were afraid of him, and so he was called the king of the forest. He liked to kill every animal that came in his way, and there was no living thing in all the land that was safe from him.

3. At last, one day, all the animals met to talk about their troubles, and see if they could not find some plan to save themselves from King Tawny Mane. They talked a long time, and then agreed what to do.

4. In the evening they went together to the lion's den. King Tawny Mane had just had a full meal, and so he did not try to harm any of them. "What do you want here?" he roared.

5. This frightened them very much. Some of them ran back into the thick woods. But the bravest stood still. "Speak, and tell me what you want," said the king.

6. Then Sharp Ears, the fox, stood up and spoke. "O king," he said, "we have come to see you about a very great matter. Do you know that if you keep on as you have begun, you will soon kill all the beasts in the forest?"

7. "And what if I do?" said Tawny Mane.

"Then what will become of you?" said Sharp Ears. "What kind of a king will you be when you have killed all your subjects?"

8 "But I must have something to eat," said Tawny Mane. "I must have food."

9. "Yes, said Sharp Ears, "and that is just what we have come to talk about. We have thought of a plan by which you shall have all the food you want without going out of doors to get it."

10. "That would be a good plan," said Tawny Mane. "But tell me what it is."

11. "We will give you one animal every day," said Sharp Ears. "We will draw lots, and the one upon whom the lot falls shall come to your den. You will not have to hunt at all."

12. "Good!" said the king. "We will try your plan, and see how we like it."

13. For some time after this, things were very quiet in the forest. Every morning one of the animals went down into Tawny Mane's den, and never came out again. The lion liked the new plan quite well.

14. At last the lot fell upon a little rabbit named Cotton Tail, and he was sent to make a call upon the king. He was in no hurry to go. He played along the road until after dinner time. Then, with big eyes and gentle steps, he went and stood at the lion's door.

15. King Tawny Mane was very hungry, and when he saw the rabbit he roared, "Why are you so late? Even the elephant knows better than to keep me waiting."

16. The rabbit bowed low and said, "I know I am late. But if you could only see what I have seen, you would not blame me."

17. "What have you seen?" said the lion.

"I have seen something that may have a good deal to do with your keeping this kingdom," said Cotton Tail.

18. "Tell me about it," said the lion. He was always afraid that something would happen to drive him out of his kingdom.

19. "I can not tell you," said Cotton Tail, "but if you will come with me, I will show you what I saw." Then he hopped away, and the lion followed him until they came to the mouth of an old well. At the bottom of the well there was a little water, and under the water there was nothing but soft sand.

20. "Just look in here," said Cotton Tail.

King Tawny Mane looked in. He thought he saw another lion at the bottom of the well. He showed his teeth; the other lion showed his teeth. "I am the king of the forest!" roared Tawny Mane. The other lion said nothing; but Tawny Mane thought that he roared.

21. "I will show you that I am the king," growled

Tawny Mane. He was so angry that he did not know what to do. He jumped into the well, only to find that there was nothing but water and soft sand at the bottom. He could not get out.

22. Then little Cotton Tail peeped down and called to the lion. "Tawny Mane," he said, "your kingdom is at an end!"

23. Little by little, Tawny Mane sank in the sand. In the evening Cotton Tail peeped down again. All was still.

24. After that, the rabbit was looked upon as a great hero of the forest. But when the other beasts wanted to make him their king, he said, "No! I am only a rabbit, and I do not want to be a king." [21]

C.

FOOD

We must never forget that we do not live to eat, but that we eat to live.

Our food is the flesh of beasts, birds, and fish, and the fruits of the earth.

Beef is the flesh of the ox, pork is the flesh of the pig, and mutton is the flesh of the sheep.

Apples grow on trees, and grapes grow on vines. Turnips and beets grow in the ground.

Bread and cake are made of flour. Tea is the leaf of a bush which grows in the far East. Coffee is the seed of a berry which grows on a tree.

Salt, which is put into most of our food, is got from mines, or from salt-water wells. [22]

For Further Reading

W. James, *Talks to Teachers on Psychology,* Chapter X.

J. Adams, *Herbartian Psychology Applied to Education,* Chapter X.

CHAPTER VI

INDIVIDUAL DIFFERENCES

§ 19. *Variability in General*

Common observation shows that children differ greatly in their mental make-up and psychology proves these differences to exist in the case of all mental qualities and to be of the utmost practical importance. In the physical characteristics of the sense and motor organs, in the strength of instincts and capacities, in the nature of their previous experiences and inborn and acquired interests—no two children are exactly alike and any one school class will show extensive differences. The same stimulus cannot be expected to produce exactly the same response in any two and will rarely produce anything like the same response from all.

Such variations exist throughout living nature; trees do not all grow equally fast, seeds will not all produce equal crops, one hundred horses will not be equally fast or strong; but the variations in human intellect and character are especially great in amount and complex in character.

The Nature of Mental Differences.—It is a common but absolutely false notion that in any quality or combination of qualities children can be divided into a 'normal' group all closely alike and a group of exceptional children differing widely from the normal. On the contrary, the form of distribution of mental traits is commonly continuous,—is such that people are found possessing every grade of ability from the highest to the lowest, every amount of the quality from the greatest to the least. Thus in addition people do not fall into two or three sharply defined classes, average adders, good adders and bad adders, but range as shown in the measurements given below of eighty-three seventh-grade pupils (Table I). Children are not active or inert, but vary all the way from greatest to least strength of the instinct of physical activity. They are not bright, average and dull, but are very, very bright, very bright, less bright, still less bright, about half way from the brightest to the dullest, somewhat dull, duller, very dull and very, very dull, with a practically infinite variety of grades in between.

TABLE I.

In a test in addition, all pupils being allowed the same time,

1	pupil	did	3	examples	correctly
2	pupils	"	4	"	"
1	"	"	5	"	"
5	"	"	6	"	"
2	"	"	7	"	"
4	"	"	8	"	"
6	"	"	9	"	"
14	"	"	10	"	"
8	"	"	11	"	"
7	"	"	12	"	"
8	"	"	13	"	"
5	"	"	14	"	"
5	"	"	15	"	"
6	"	"	16	"	"
1	"	"	17	"	"
5	"	"	18	"	"
1	"	"	19	"	"
2	"	"	20	"	"

Their Amount.—Small differences are more frequent than large ones. In the case of the addition ability described above a patient reader can figure out that there are about 240 times as many differences of 1 as there are of 17, that there are 70 times as many differences of 2 or less as there are of 15 or more, and that there are about 8 times as many differences of 0 to 8 as there are of 9 to 17. And in general the form of distribution is such that between very many individuals the differences are little, that between many they are moderate and that between a few only are they very great. The exact facts in the case of the abilities of the seventh-grade pupils in addition are as shown in Table II.

TABLE II.

Of the 3403 differences between one seventh-grade pupil and another of the 83 tested in addition,

247	were	differences of	0	amount
476	"	"	1	"
460	"	"	2	"
420	"	"	3	"
382	"	"	4	"
334	"	"	5	"
282	"	"	6	"
219	"	"	7	"
188	"	"	8	"
126	"	"	9	"
109	"	"	10	"
53	"	"	11	"
48	"	"	12	"
26	"	"	13	"
18	"	"	14	"
10	"	"	15	"
3	"	"	16	"
2	"	"	17	"

In the case of the ability in addition we notice also that the different grades of ability are by no means equally frequent, but that all the cases cluster around the abilities 10 to 13 (see Table I). This fact becomes even clearer if one pictures the frequency of each of the different grades of ability by the size of an area as in FIG. 1 and FIG. 2.

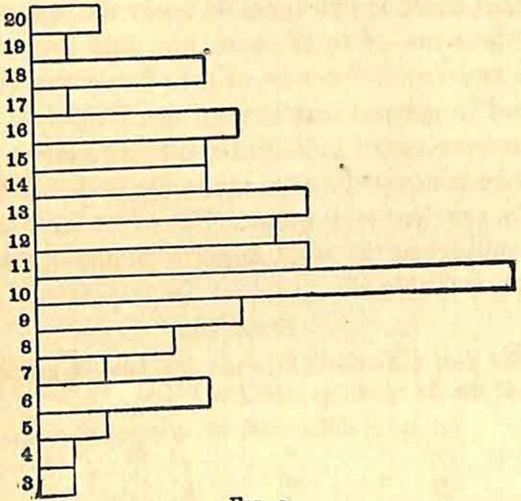

FIG. 1.

FIG. 1. The different abilities in addition are denoted on a vertical scale, 3 meaning 3 examples done correctly, 4 meaning 4 examples done correctly, and so on for 5, 6, 7, 8, etc. The number of pupils who were of each ability is denoted by the horizontal length of the column in each case, each sixth of an inch of horizontal length standing for one individual. Thus there was 1 pupil who did only 3 examples correctly, 1 who did only 4 examples, 2 who did 5, 5 who did 6 and so on. It is obvious at a glance that there are far more individuals, *i. e.* that there is a far larger surface, in the middle third of the scale than in the lower or in the upper third.

In any group of the same general class with respect to age or training, such a clustering of the cases, commonly around a medium degree of the ability, will be the case. Individuals, that is, vary about a central type, so that we can think of any single individual's ability as a plus or minus deviation from the central tendency or type of his age, sex or grade. Tables III to VIII show this in the case of the distribution of six different abilities. The facts of Tables III-VIII are presented graphically in FIGS. 3-8.

The amount of difference actually found in children of the same age or in children in the same school grade is greater than teachers perhaps realize. The range of ability in school children[1] of the same age is such that in a majority of capacities the most gifted child will, in comparison with the least gifted child of the same age, do over six times as much in the same time or do the same amount with less than a sixth as many errors. The samples given in Tables III, IV and VII and FIGS. 3, 4 and 7 give a concrete idea of the amount of the differences between children of the same year-age in representative capacities.

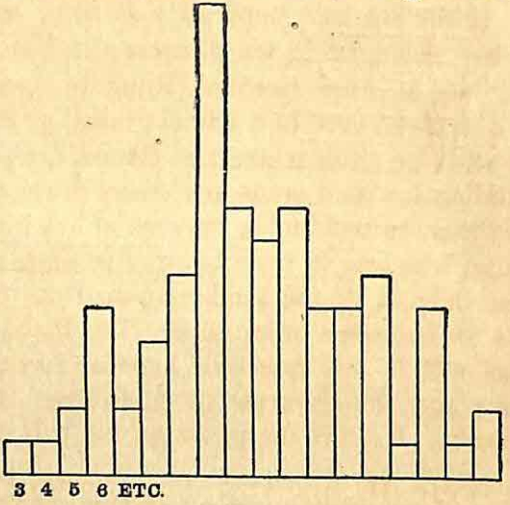

FIG. 2.

FIG. 2. This is constructed on the same general principle as FIG. 1, the difference being that in FIG. 2 the scale of ability is drawn from left to right instead of from low down to high up. Hence in this case, the *vertical* length of the columns represents the number of pupils, *i. e.*, the frequency of each ability.

If the best speller of a class can spell correctly such words as fatiguing, appreciate, delicious, guarantee, triumph and accident, the worst speller will barely spell such words as house, dollar, potato, present, severe and praise. If the weakest pupil of a class in computation can do five examples in ten minutes the best pupil will probably do at least twenty. Roughly speaking, the teacher of a class, even in a school graded as closely as is possible in large cities where two classes are provided in each building for each grade and where promotion occurs every six months, will find in the case of any kind of work some pupil who can do from two to five times as much in the same time or do the same amount from two to five times as well as some other pupil. The highest tenth of her class will in any one trait have an average ability from one and three-fourths to four times that of the lowest tenth. Even if she picks out the half of the class

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[1] These figures are true for the children whom teachers have in regular classes,—for such children as are not so far below the average as to fail to get on at all in school. If pronounced defectives were included the range of differences would be still greater.

TABLE III.
The abilities of 11 year olds in addition.

Scores made in addition	Number of pupils
5 or 6 by	1 pupil
7 " 8 "	1 "
9 " 10 "	4 " s
11 " 12 "	4 "
13 " 14 "	2 "
15 " 16 "	4 "
17 " 18 "	9 "
19 " 20 "	13 "
21 " 22 "	21 "
23 " 24 "	13 "
25 " 26 "	9 "
27 " 28 "	12 "
29 " 30 "	4 "
31 " 32 "	4 "
33 " 34 "	1 "
35 " 36 "	1 "
37 " 38 "	1 "
39 " 40 "	2 "
41 " 42 "	1 "
43 " 44 "	2 "

TABLE IV.
The rapidity of movement of 10 year old girls

Number of crosses made in a fixed time	Number of children
6 or 7 by	1 girl
8 " 9 "	0 "
10 " 11 "	4 " s
12 " 13 "	3 "
14 " 15 "	21 "
16 " 17 "	29 "
18 " 19 "	33 "
20 " 21 "	13 "
22 " 23 "	15 "
24 " 25 "	11 "
26 " 27 "	5 "
28 " 29 "	2 "
30 " 31 "	5 "
32 " 33 "	3 "
34 " 35 "	5 "
36 " 37 "	0 "
38 " 39 "	4 "
40 " 41 "	1 "

Table V.

The abilities of 6th grade girls in observing mispelled words.

Number of misspellings noticed		Number of children
10 to 14	by	1 girl
15 “ 19	“	6 “ s
20 “ 24	“	10 “
25 “ 29	“	18 “
30 “ 34	“	25 “
35 “ 39	“	27 “
40 “ 44	“	35 “
45 “ 49	“	18 “
50 “ 54	“	25 “
55 “ 59	“	17 “
60 “ 64	“	18 “
65 “ 69	“	10 “
70 “ 74	“	3 “
75 “ 79	“	2 “
80 “ 84	“	2 “
85 “ 89	“	1 “
90 “ 94	“	1 “

Table VI.

The abilities of 4th grade girls in thinking of the opposites of words.

Score made in test with opposites		Number of children
—9 to —5	by	3 girls
—4 “ 0	“	5 “
0 “ 4	“	8 “
5 “ 9	“	10 “
10 “ 14	“	33 “
15 “ 19	“	36 “
20 “ 24	“	29 “
25 “ 29	“	16 “
30 “ 34	“	11 “
35 “ 39	“	4 “
40 “ 44	“	3 “

Table VII.

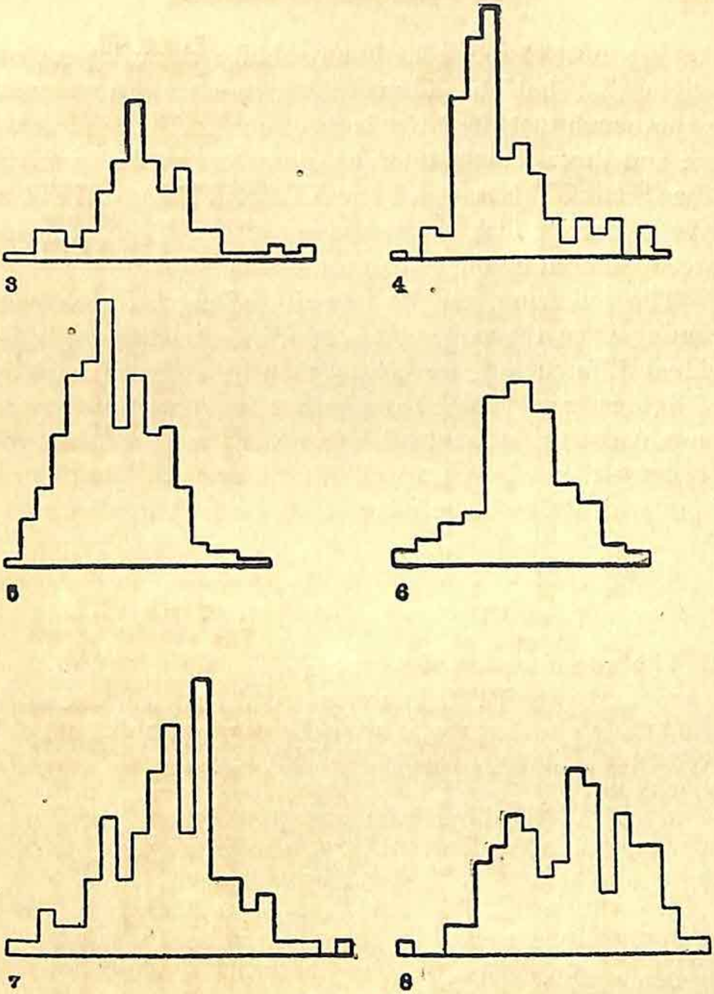
The abilities of 12 year old boys in observing letters.

Number of A’s marked		Number of children
28 or 29	by	1 boy
30 “ 31	“	1 “
32 “ 33	“	3 “ s
34 “ 35	“	2 “
36 “ 37	“	2 “
38 “ 39	“	5 “
40 “ 41	“	9 “
42 “ 43	“	5 “
44 “ 45	“	8 “
46 “ 47	“	12 “
48 “ 49	“	15 “
50 “ 51	“	8 “
52 “ 53	“	18 “
54 “ 55	“	5 “
56 “ 57	“	5 “
58 “ 59	“	3 “
60 “ 61	“	4 “
62 “ 63	“	1 “
64 “ 65	“	1 “
66 “ 67	“	1 “
68 “ 69	“	0 “
70 “ 71	“	1 “

Table VIII.

The abilities of 4th grade boys in spelling.

Per cent. of words spelled correctly		Number of children
20 to 23	by	1 boy
24 “ 27	“	0 “
28 “ 31	“	0 “
32 “ 35	“	2 “ s
36 “ 39	“	2 “
40 “ 43	“	6 “
44 “ 47	“	7 “
48 “ 51	“	9 “
52 “ 55	“	8 “
56 “ 59	“	5 “
60 “ 63	“	6 “
64 “ 67	“	12 “
68 “ 71	“	11 “
72 “ 75	“	4 “
76 “ 79	“	9 “
80 “ 83	“	7 “
84 “ 87	“	7 “
88 “ 91	“	3 “
92 “ 95	“	1 “
96 “ 99	“	1 “



FIGS. 3-8.

FIGS. 3-8. These figures represent the facts of tables III-VIII. They are drawn after the same plan as FIG. 2 except that the sides of the columns are omitted where they are not needed to show the form of distribution.

Fig. 3 represents the abilities of 11 year olds in addition.
Fig. 4 " " " " 10 year old girls in rapidity of movement.
Fig. 5 " " " " 6th grade girls in observing misspelled words.
Fig. 6 " " " " 4th grade girls in thinking of opposites of words
Fig. 7 " " " " 12 year boys in observing letters.
Fig. 8 " " " " 4th grade boys in spelling.

that are most closely alike in any ability, she will yet find within that half a difference between its lowest and highest such that the latter is from one and one-fourth to one and three-fourths times as competent as the former.[1] The facts of Tables V, VI and VIII and FIGS. 5. 6 and 8 give a concrete idea of the amount of the differences between children of the same grade.

The following samples of pairs of papers, each pair coming from the same class-room, tell the story of individual differences more vividly than any words or tables of figures can. These samples are in every way representative of the amount of difference to be expected in an ordinary class of even a well graded school. The classes from which they come were taken quite at random.

Two papers, A and B, written by members of the same grade and class in a test of logical power.

The questions asked were:—

1. A boy said: "I know ten good men who are doctors and ten bad men who are policemen. So doctors are better men than policemen." Did he prove it? Why? or why not?

2. If all the boys who are good in arithmetic are good in spelling, will all the boys who are good in spelling be good in arithmetic? Why? or why not?

3. A man said: "I know forty boys that studied hard and they all were promoted every year; so if you want to get rich, study hard." Was he right? Why? or why not?

4. If there was no bread or flour would everyone starve?

5. Is this true: "The more we eat, the more we grow"?

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[1] The statements and figures of these paragraphs are by no means guesses but are made on the basis of measurements of the actual differences found by measuring the abilities of thousands of school children in a dozen or more different traits.

6. Is this true: "If people were all blind, some women would not wear pretty dresses"?

7. If there were no schools, would children learn anything?

8. What difference would it make to people if the price of coal went up to twice what it is now?

9. Why do people send their children to school instead of making them work?

10. Which would be the worse: to have all the money in the world disappear or to have all the steel in the world disappear? Why?

A.

1. The boy did not prove it. There may be as many good policemen as there are doctors, even if he did not happen to know any.

2. No. Some boys may be able to spell well, even if they are *not* good in arith. I know from experience.

3. He was not right. The boys might have graduated from the school and yet be poor. A great many rich men have little or no education.

4. No!

5. No!

6. Yes.

7. They might.

8. People would either spend twice as much for coal as they do, or they would not use as much. They might burn wood instead, so they could probably keep warm.

9. A man or a woman with an education is a great deal better mentally and morally, and possibly physically, for they can earn their own living better when they grow up, as teachers, lawyers, doctors, etc., than they could if they chopped wood or dug in a tunnel for a living.

10. To have all the money disappear, because the whole world (or most of it) would be reduced to want and misery without money, whereas, if we have money we can make steel from iron.

B.

1. (No answer made).

2. are all good. 2. yes. because they because these question says they are

3. yes. because all that study hard will know how to make money and so get rich.
4. no
5. yes.
6. yes
7. I dont believe so
8. It would make them twice as poor as they are now and the poor of today would freeze to death.
9. because they wont to fit them to work in the world when they have grown up.
10. All the money. because we need steel for building buildings and houses to live in.

Two papers, A and B, written by members of the same grade and class in a test of logical memory.

The following passage was read once and the children were asked to write the facts stated in the passage in their own or the author's words:—

Everywhere air is the first and food is the second necessity of existence.

The air we generally take for granted; but it is obviously impossible to get it pure in a town like Manchester, and very difficult to get it at all at the bottom of a mine 4,000 feet deep. This extreme depth is very rarely reached, for instance in mines near Berlin or near Prague; but it is certain that in any large town in a mining district the quality of the air both above and below ground most seriously affects the population.

Moreover, its physical effects are not the worst. In the yearly records of crime such towns occupy most unenviable positions.

A.

Air is the first and food is the second necessity for life. We generally take air for granted, but it is very difficult to obtain pure air in a town like Manchester and very hard to get at all, at the bottom of a mine three or four thousand feet deep. Such depths as this are seldom reached, however, as for example the mines of Berlin and .

Moreover, lack of air is not only physically bad, but morally, for in such places the rate of crime is very high.

B.

air is not hard to get in high places but in mines and other places of the earth where the ground is low it is hard to get in the extrem it also affects the people seriously.

Two papers, A and B, written in a test like the preceding, the passage read being as follows:—

The soils of the world may roughly be divided into two great groups, according to the way the materials of that soil have been accumulated. We may have a soil which has been formed by the decaying of the rock on which it lies, or we may have a soil the particles of which have been brought from very many places and perhaps from a great distance. Of the latter group the more important are the soils carried along and finally deposited either by the rivers, the wind, or by moving ice.

A.

The soils of the world may roughly be divided into two kinds. This is partly due to the materials of which the soil is made. Sometimes it is due to the decaying of the rock on which it is. Another kind is that which has been gathered from different places by the wind, rivers or ice.

B.

The rock is sometimes deposited by moving ice sometimes by

Two translations, A and B, made by two pupils of the same grade and class (and age).

The passage to be translated was as follows:—

Atticus adolescentulus propter affinitatem P. Sulpicii, qui tribunus plebi interfectus est, non expers fuit illius periculi. Namque Anicia, Pomponii consobrina, nupserat (M.) Servio, fratri Sulpicii. Itaque interfecto Sulpicio, posteaquam vidit Cinnano tumultu civitatem esse perturbatam neque sibi dari facultatem pro dignitate vivendi, quin alterutram partem offenderet, dissociatis animis civium, cum alii Sullanis, alii Cinnanis faverent partibus, idoneum tempus ratus studiis obsequendi suis, Athenas se contulit. Ac ne illa peregrinatio detrimentum aliquod afferret rei familiari, eodem magnam partem fortunarum traiecit suarum. Hic ita vixit, ut universis Atheniensibus merito esset carissimus.

Tranquillatis autem rebus Romanis remigravit Romam, ut opinor, L. Cotta et L. Torquato consulibus, quem quidem sic universa civitas Atheniensium prosecuta est, ut lacrimis desiderii futuri dolorem indicaret.

A.

Atticus a young man because of his friendship with Sulpicius, the tribune of the people who was killed was not free from this danger. For Anicia the wife of Pomponius had nursed Servius, brother of Sulpicius. And so after Sulpicius was killed and after he saw that the state was aroused by the revolt of Cinna and that no opportunity was given for him to live in accordance with his dignity without offending one or other of the parties, for the minds of the people were divided, some favoring the party of Sulla, some that of Cinna, and after he thought it was a proper time for pursuing his studies, he betook himself to Athens. And lest this migration should bring any disgrace upon his private affairs (family) he transferred a great part of his fortune to this state. Here he so lived that because of his worth he was most highly esteemed by all the Athenians (literally was most dear to all Athenians).

B.

Atticus a youth on account of P. Sulpicus who was a tribune of the people, was not of his danger. And for Anicia, of Pompey, had , the father of Sulpicuo. And so by the killing of Sulpicius, after he saw the state to be disturbed by a tumult nor to give to himself the ability on account of his dignity, that might offend the other part, the unassociated minds of the citizens, with some Sullani other Cinnane might be favored by some the time was followed with their desires, Athens carried itself. And lest that some determination was brought to the common interest, by the same a great part of their fortune was brought. He so won that he was named the most dear to all Athens.

Two papers, A and B, written by members of the same grade and class in a test in algebra.

The test was:—

Do these examples as quickly as you can.

Do not copy them but put the work right under each example.

Take the quickest way you can to get the correct answers:

1. Simplify

$$\left(\frac{a^2-b^2}{x-y}\right)\left(\frac{x^2-y^2}{a-b}\right)\left(\frac{c^2}{x+y}\right)$$

2. What are the values of x and y if $5x+3y=8$
and $7x-3y=4$

3. A shepherd being asked how many sheep he had in his flock, said "If I had as many more, half as many more, and seven sheep and a half, I should then have 500." How many sheep had he?

4. What are the values of x and y if $1-\frac{x+y}{x-y}=\frac{3x}{x-y}$
and $\frac{7x-3y}{23}=3$

5. Simplify

$$\frac{\frac{m+n}{m-n}+\frac{m-n}{m+n}}{\frac{m-n}{m+n}-\frac{m+n}{m-n}}$$

6. If to the double of a certain number 14 be added, the sum is 154. What is the number?